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Shadows and Straws

CONSTANTINOPLE and the Golden Horn! The words are almost magic in their power to weave a fantasy of mosque and minaret set gaily amid the riotous splash of Eastern color, or toned more soberly with the mystic dignity of the Orient. Men say that the city of Constantinople sits upon the noblest site in the world, and that the memory of her glories haunts them with an abiding presence.

"Secure as a mountain fortress guarded on both sides by impregnable passes, she stands protected on either hand by rushing straits like deep salt rivers—straits renowned in the history of three thousand years, and adding each century to their renown. Whoever for the next hundred years shall possess her will hold a key to one of the world's great doors."

Napoleon said that to command her was the ultimate end of all European diplomacy, and, upon the great chessboard of world affairs, what other piece has been so powerful in proclaiming both mates and stalemates?

Christened Byzantium, she bore the name for a thousand years. For fifteen hundred more she has been Constantinople, as much Eastern as Western, and yet with something specially her own, not of the East nor yet of the West. So great was the struggle for the possession of the city of Constantine that its sieges are among the most memorable in history. The Persians, seeking to pierce its defences, were once camped for ten years across the Bosphorus. Goths and Huns, Slavs and Persians, Bulgarians and Hungarians, Turks and Russians have battered at its gates, which, for a thousand years, marked the easternmost fortress of western civilization, controlled the destiny of an empire and the fate of a religion.

For fourteen hundred years, almost, she has treasured and miraculously guarded the church of Sta. Sophia. In regard to the difficult question, involving factors not easily realized or measured by the western mind, as to what religious authority shall take over Sta. Sophia in the future, *The Nation* (London), has an excellent article from which we quote:

"Constantine himself, in designing his new 'City of Rome,' chose the site for the basilica consecrated to the Divine Wisdom. Destroyed by fire only two or three generations later, during the riots which followed St. Chrysostom's endeavor to amend the city's way of life, the basilica was rebuilt on more splendid lines. But it was again destroyed during the 'Nika' dissensions of Blues and Greens in the Hippodrome. . . . That was in 532, and it was then that Justinian began the amazing edifice which remains a wonder of the world, although from time to time exposed to religious discords as destructive, though perhaps less wanton than the rivalries of racing chariots wearing the colors of Blue or Green. His pious intention was, no doubt, encouraged by Theodora, that incomparable prostitute, whom he had raised to the throne which she was afterward to save, and whom he certainly consulted in his codification of moral and legal institutions. It was, however, to the great architect, Anthemius, that the triumph of the structure was due; and it was through his skill that the church has survived the assaults and batteries of so much and so diversified religion. It even survived the burning of the city, the pitiless massacre of the inhabitants, and its own desecration by the Catholics of the Fourth Crusade under Dandolo, the blind Doge of Venice. It survived, with hardly less risk, though the enemy was no longer included in the same Christian brotherhood—it survived the final capture of the city by the Turks on that fatal Tuesday in May, 1453, when the Sultan, Mahomet II, himself interposed to save it.

"On the evening before that dreadful day, the last of the Byzantine Emperors, passing on his way to death upon the breach, attended the last Christian service held up to now within that temple of God's Wisdom. Next evening the devastation began, and the old church was plundered

of its accumulated treasures, and of the pillars and marbles once plundered by Justinian from the no less beautiful shrines of classic deities. For nine centuries the church had stood as the center of Greek orthodox faith, and around it had raged the controversies of impalpable metaphysics to which the Greek mind was naturally prone—controversies more subtle, though hardly less embittered, than the doctrinal divisions of the Western Churches. Now, for nearly 470 years, though retaining the name of Wisdom (since Wisdom is universally assumed among the divine attributes), and though still haunted by strange omens and visions of a Christian past, the great church has been a Mohammedan mosque, the old inscriptions nearly obliterated, the sacred mosaics upon its walls whitewashed over, the set of the building thrust all askew so as to point south rather than east, toward the Prophet's tomb."

INTO WHAT HANDS IT IS NOW to be entrusted is one among the many minor problems involved in the readjustment of Europe.

"Indeed," continues *The Nation*, "it is hardly to be called a minor question, even among the enormous problems now affecting the very existence of mankind. That ancient dome, now barely supported by its flanking walls, stands as a sacred symbol to the whole Greek race and to the whole Greek form of Christianity, including such religion as may remain in the Russian Empire and the Balkan States; including even Bulgaria, where the Exarchist schism is still young, as schisms go, and where the thought of a Bulgarian Tsar entering the city and restoring the Cross to Saint Sophia acted like a divine inspiration upon the Bulgarian peasant soldiers in the Balkan War of 1912.

"Restoration to the orthodox church would seem quite easy, were it not that the church has become a symbol to Islam as well, and Moslems can found their claim on present possession and constant use. There must be a Statute of Limitations to historical claims, they might well plead; otherwise to what form of Christian religion should the old cathedrals of England belong? 'Shall idolaters who kiss pictures and bow before the semblance of created man worship again in the shrine which the Sword of Islam has purged? Will you light a spark of unquenchable rage in the hearts of millions among the Faithful inhabiting the vast regions of a British Empire, soon to be made vaster still? Rather will we shatter the holy building itself before we go, and leave the Greeks nothing but a ruin of crumbling stones to weep over.' "

Frederick Harrison, writing some fifty years ago, commenting upon the final capture of Constantinople by the Turks and of the religious transformation of Sta. Sophia, wrote as follows:

"It is a fact, almost without parallel in the history of religion, that the Mussulman conquerors adopted the Christian cathedral as their own fane, without injuring it, with very little alteration within, and even without changing its name."

His description of the church itself is a memorable one and well worth reprinting here:

"The Church of S. Sophia is, next to the Pantheon at Rome, the most central and historic edifice standing erect. It is now in its fourteenth century of continuous and unbroken use; and during the whole of that vast epoch, it has never ceased to be the imperial fane of the Eastern World, nor has it ever, as the Pantheon, been desolate and despoiled. Its influence over Eastern architecture has been as wide as that of the Pantheon over Western architecture, and it has been far more continuous. It was one of the most original, daring, and triumphant conceptions in the whole record of human building; and Mr. Fergusson declares it to be internally 'the most perfect and beautiful church ever yet erected by any Christian people.' Its interior is certainly the most harmonious, most complete, and least faulty of all the great domed and round-arched temples. It unites sublimity of construction with grace of detail, splendour of decoration with indestructible material. It avoids the conspicuous faults of the great temples of Rome and of Florence, whilst it is far richer in decorative effect within than our own St. Paul's or the Pantheon at Paris. Its glorious vesture of marble, mosaic, carving, and cast metal is unsurpassed by the richest of Gothic cathedrals, and is far more enduring. Though twice as old as Westminster Abbey, it has suffered less dilapidation, and will long outlast it. Its constructive mass and its internal ornamentation far exceed in solidity the slender shafts, the paintings, and the stained glass of the Gothic churches. In this masterly type the mind is aroused by the infinite subtlety of construction, and the eye is delighted with the inexhaustible harmonies of a superb design worked out in most gorgeous materials.

"For Justinian and his successors ransacked the empire to find the most precious materials for the 'Great Church.' The interior is still one vast pile of marble, porphyry, and polished granite, white marbles with rosy streaks, green marbles, blue and black, starred or veined with white. The pagan temples were stripped of their columns and capitals; monoliths and colossal slabs were transported from Rome, and from the Nile, from Syria, Asia Minor, and Greece, so that, with the Pantheon at Rome, this is the one example of a grand structure of ancient art which still remains unruined. The gilded portals, the jewels, pearls, and gold of the altar, the choir adornment of cedar, amber, ivory, and silver, have long been destroyed by the greedy soldiers of the Cross; and the mosaics above with seraphim, apostles, prophets, and Christ in glory have been covered up, but not destroyed, by the fierce soldiers of Mahomet "

SIR THOMAS JACKSON now raises the question of the structural stability of the dome of Sta. Sophia in a letter to *The Times* (London). While in Constantinople in 1910 he was asked by the Turkish Ecclesiastical Commission to inspect the building and report on its condition, and although he was unable at that time to make more than a short examination, the serious nature of its structural defects was very evident. He says:

"I found on examining the building a serious inclination outwards in the side walls north and south, together

with the columns on each floor next to them. The columns at the northeast and southeast corners lean out diagonally, both in the ground story and the gallery. The northwest part, where the 'sweating column' stands, is better supported by buildings outside, but by plumbing the walls in the center of the building it appeared that the inclination was as much as 1 in 43. This yielding of the side walls has dislocated the arches and the vaulting; the arches through the great buttresses are much deformed, and no longer semi-circular; some of the vaults have sunk badly, and one in the north gallery seems in danger of falling.

"An alarming bulge in the northeast pendentive catches the eye as one enters the church; but it is only when seen from the gallery surrounding the dome at its springing that the full amount of the disturbance can be detected. From that level it will be seen that three of the great arches carrying the dome are much deformed, and that all the pendentives have suffered and lost their shape, so that the base of the dome no longer forms a true circle. The dome is constructed with 40 ribs of brick, converging on a circle at the crown; the crown seems to have sunk, and many of the ribs, especially on the east, south, northeast, and southwest sides, have sunk so badly as to have lost their arch construction, and to have become either straight or convex on their under side, where they should be concave. . . . The deformation of the dome is nothing new; it is noticed in Salzenberg's volume, published more than half a century ago. It is the result of a long series of catastrophes; M. Antoniades gives a list of, I think, 35 earthquakes by which the church has been shaken, and by which, in my opinion, the resistance of the great buttresses north and south has been weakened. It is to them, I think, that attention should in the first place be given and to the great piers which they support, and till they are secured it would be in vain to try to mend the dome. That the dome has not fallen is due to the singular stability of this form of construction. I remember noticing at Casamicciola, in the island of Ischia, that while most of the ordinary churches were thrown down by the great earthquake of 1883, and were still ruins, those that had cupolas were still standing. At Sta. Sophia, Paul the Silentiary tells us that, while half the dome fell 21 years after it was built, the other half remained 'insecurely hanging in the air, a wonder to behold.' Its construction by ribs makes this very intelligible, and also makes any reconstruction more easy. That it has survived to this day is a wonder, but the time has come when something more than the patching and propping by which it has hitherto been sustained is necessary, and when the construction should be seriously and scientifically repaired.

"There is no need to dwell on the loss to the world should any disaster befall Sta. Sophia. It is a building unique both artistically and historically. It is the perfect flower of Byzantine architecture; it is a marvel of construction that has never been rivalled or repeated; and it has been the scene of events from Justinian downwards that have influenced the history of mankind."

Who will not cherish a fervent hope that this church, one of the sublime architectural achievements of all time, may not be made safe against both the ravages of time as well as against such a tragedy as that to which *The Nation* alludes?

HOW STRANGE IT SEEMS to read that the actors of England have rebelled against the commercialism of the drama and that they have adopted, among other things, a Standard Contract! In a letter to *The Nation* (London), Mr. Ivor Brown narrates the history of the movement, and in these days of professional quickening and stirring (a similar movement is reported among the actors in the United States), it may not be amiss to give ear to what one of the oldest professions in the world has accomplished in an old country. We quote from Mr. Brown's letter as follows:

"All who are interested, from whatever standpoint, in the welfare of the drama must be heartened by the energy of the Actors' Association, which has culminated in the securing of a Standard Contract. Never were trade union organisers faced with a more formidable task than when they set out to overcome by assault the chaos of the dramatic profession. For theatrical life is not only hedged about with the traditions of commercialism, but it is also a stronghold of individualism. At first the profession resented the idea of trade unionism as undignified, but this idle folly was soon routed by the combination of courageous propaganda and of economic fact. The tremendous rise in the cost of living forced the lower-paid ranks of the actors to unite despite of any remnants of false pride. The managers might still expect the chorus girl to rehearse for nothing and dress like a duchess on a wage of thirty-five shillings for those weeks in the year when she was at work; but those expectations were happily in vain. The logic of events proved irresistible. The Actors' Association became a trade union; members poured in and the 800 of last year became the 6,000 of today.

"An agreement has been reached between the Association and the West-End managers, . . . based on the lines of most trade union settlements between employers and employed: it is, roughly, an 'hours and wages' understanding. The minimum wage of the actor (the word must of course be interpreted bi-sexually) is to be three pounds for a week of acting and two pounds for a week of rehearsing. Engagements must be either for the run of the piece or for a period of not less than four weeks, with fourteen days' notice on either side.

"But the Actors' Association has not limited itself to the consideration of hours and wages, vital though such considerations are. Mr. Sydney Valentine, speaking as chairman, . . . said that there would be established a proper training-school for actors and that they hoped to make the Association the only means of entry into the profession. What is this but the revival of the guild and the assumption by the producer of responsibility to the public for the quality of his wares? No wonder that Miss Lilian Braithwaite, (also speaking) justified trade unionism in an artistic profession against snobbish criticism by an allusion to the medieval guilds. Control of entry to the

profession by the existing members is a strong weapon against the unscrupulous employer who would go out into the highways and hedges for cheap and unqualified labor. The ordinary actor can always justify the wretched state of our drama by pointing to the commercial syndicate that buys its labor as it buys its programme-paper. If the employer can only obtain labor that has passed through the training authorised by the union, then the union takes the responsibility for the quality. Mr. Valentine also foreshadowed the Actors' Association Theatre, and, indeed, such a proposal is the logical outcome of a trade unionism which accepts responsibility while it demands its rights. The National and Municipal Theatres of tomorrow will assuredly not be run by an official in Whitehall or by the local sons of Bumble. They will be controlled by the actors themselves. . . .

"The Association intends to be responsible to its members for making their profession 'one that everyone could be proud to belong to, a profession in which all members could live an honest and wholesome life.' It also intends to give the community a pledge that every actor is a trained and competent artist, and that, as far as in it lies, the English drama shall be rescued from the exploitation of syndicates who think only in terms of dividends. There may still be a long way to go, but there seems to be no lack of determination in the voyagers, and no lack of skill in the guides."

READERS WHO ARE AWARE of the tremendous trade union movement in England, of its new character, of its extension into the field of brain-workers, teachers, clerks; of the economic foresight of its leaders; of the impending changes in industries which are destined to reshape the national life; of the extension of the functions of the unions to a point where they shall not only share in the control of industry (as now seems assured in coal and railways), but perhaps take over the entire control of it, will perceive the significance of this program of the Actors' Association. But it is wise to realize all that this means; the element of responsibility is stressed in all that Mr. Ivor Brown says, and it is only by the acceptance of responsibility that any real progress can be made. Any organization that uses joint action merely to protect its financial interests will be reduced to impotence in the future. Such an organization will thrive and prosper just in so far as it accepts responsibility for the professional performance of its members, and that will be possible only by a control of the means of entry into the profession, just as in the days of the guilds. If the actors of England do not raise the professional standards of their art and give better plays and better acting, their guild will be of no avail.

But the modern guilds of England must not be confused with the medieval guilds. They are based upon the principle of organization along industrial lines. All men or women, no matter in what capacity or whether working with hand or with brain, who gain a livelihood from any industry, will form the guild of that industry. The State would own the means of production, or the plant and equipment, while the industry would be operated by the guilds. They would have a central guilds congress presiding over the whole organization of producers, for every producer would have to be a member of a guild, while the State would be represented by a parliament or congress representing the entire organization of consumers.

It is the guild's principle carried forward to a point where it would unite with the State not only in the political control of the nation, but in the industrial control. Centralized industry, first established in England, appears to have come to a definite parting of the ways, and may develop new relations of industry to government such as will eventually affect all countries.

THE NATIONAL GUILDS OF ENGLAND offer a principle of industrialism which must make an instant appeal to whoever thinks of industry in terms of work willingly done, of work made interesting and even joyous, of work dignified as a service no matter what form it may take, of collaboration in a common effort toward the amelioration of the ills of men. It does not mean that industry would be controlled by a bureaucracy. On the contrary, it aims at the reduction of the bureaucracy and the end of that indifferent result which always seems to follow a governmental operation, and the setting up of a form of control that means competent workmen fairly paid, an education founded upon both general culture and a trade apprenticeship, and a centralized responsibility for the performance of the guildsman and for the product that comes from his labor.

It is not a perfect cure for all the present-day maladies of government and of industry, but it is by far the most worthy step forward, out of blind chaos and into human ways, that philosophers have so far offered to the world. Unless it, too, is quickened by a spiritual stirring through which men shall learn the dignity and value of life itself, in all humans wherever found, then the guild will fail to achieve

all the possibilities that lie within its philosophy.

Architects will perceive in Mr. Brown's narrative many points related to the architectural profession, particularly in connection with individualism, education, responsibility, and control.

ANOTHER INTERESTING ORGANIZATION movement in England is also referred to in the Journal of the R. I. B. A., and is as follows:

The first meeting of the Architects' Assistants' Professional Union was held on April 29 for the purpose of extending the movement for the formation of a union for salaried architects, quantity surveyors, draughtsmen, and technical assistants. The stated intention of the union is to secure: (1) The improvement of the status of the professional assistant; (2) the efficiency and training of professional men; (3) adequate salaries and payment for overtime; (4) open references; (5) abolition of unpaid assistants; (6) representation of assistants in professional bodies; (7) the encouragement of a feeling of coöperation between the practising architect and his assistants for the mutual benefit of both. In constituting the union it is proposed to have an executive council elected at a general meeting, which council should consist of fifteen members, two of whom would be elected by the probationary members. The president would be elected from the committee and by them, and would hold office for one year. Subcommittees would be elected by the general committee to deal with specific subjects, and their reports would be referred to the general committee for approval. A full member must be an assistant on work governed by the scales of the R. I. B. A. or M. S. A. at the time of application for membership, or must have had five years' experience and such technical training as might be approved by the committee. C. H. W.

Education Toward Reality*

By C. GRANT LA FARGE

THERE is no small measure of temerity in my venturing thus to address you upon a subject of which I can claim no practical experience. What right I may possess in the premises springs from the prolonged opportunity life has given me to observe my own deficiencies as well as those of others about me, and from certain reflections occurring as the result of what I have encountered in Government service. This has led me, as the war has led so many people, to see some old things in a new light, and, perhaps, if not to see them very clearly yet, at least to suspect that there are new things to be seen. I must be general rather than specific; speak of principles rather than methods; if in my thoughts there chance to be anything of value, your discussion of it should point the way to giving it practical effect.

All of what I mean to say is in advocacy of reality; of making the educational processes with which we are concerned lead, as all other education should lead, toward the reality of life and its exactions, not away from them; of not fearing to heave overboard even the most cherished rubbish, once we find it to be rubbish; of daring to follow new paths, no matter how troublesome, if they will lead to the real highways men must travel. But if anyone thinks I stand here to propose the scrapping of all old things, the deriding of all tradition, that I have swallowed whole all the recent educational panaceas, let him now discharge his mind of that notion. This is not the occasion to discuss the subject, but one thing may be said: Tradition may be good or it may be bad; we suffer as much from the bad as we benefit by the good; I would scrap the bad ones. I would see all of them subjected to the kind of impartial scrutiny, based upon no previous assumption either of sacrosanctity or imbecility, that would determine which were valid and which not. If I can have my way, you may fasten on me any label that best suits your predilections, and I shall not much care what it is.

My concern is with reality, whose bounds are not what we may touch and weigh, buy and sell—not material only. It includes them, for whoso builds must deal with them; it includes also the reactions, one upon another, and the relations, of material facts and things and those motives, acts, and feelings which in their sum make the life of the individual and the community. Of these relations and reactions the war has shown us that we must open our eyes to new views.

The purpose of our present inquiry is the education of those who mean to be architects. To determine your education you need first to know what result you propose to accomplish;

*An address delivered before the Society of Technology Architects.

therefore, I shall take a glance at ends before I inquire into means.

The architectural world has for some time past been in a state of dissatisfied, apprehensive unrest which has found expression in many ways —in schemes to advertise itself, its usefulness, and significance; in somewhat nebulous speculation about the causes of public indifference and lack of appreciation; in protests against the invasion by others of its legitimate, preëmpted field; in assaults upon canons of professional ethics, as though their lesser technicalities were of much moment to a busy, preoccupied world or of any great effect in a body that, while wrangling over the letter, disregarded the spirit; above all, in the agitated critical self-analysis, the anxious reaching out for ways to a better status, that have filled, and are filling, so many pages of their magazines.

Were one a humorist, were he looking only for contributions to the human comedy, these expositions of our intellectual vagaries, our gropings and bewilderment, our occasional horse-sense, would furnish no little curious entertainment. But that is hardly the becoming rôle for us, in face of the quite real predicament of our calling. So, with no attempt at any sifting of values or determination of the relative luminosity of the explanations offered to account for our woes, or the proposals made for their cure, let us try to see what it all means; let us seek some common source from which flows the vexed tumult of this troubled stream. And if I am not mistaken, if my own flounderings in many bogs in pursuit of will-o'-the-wisps have not induced a habit that has set me forever astray, then we shall find it in the detachment of the profession from the actualities of contemporaneous thought and life, that is, from reality. The evidence of this, very plain it seems to me, appears in the character of the unrest. It is pervaded, throughout most of its manifestations, by a constant note of anxiety, conscious or subconscious, over failure to maintain practical connection with the popular energy; the most pertinent advice, so far as practicality is concerned, comes from those whose individual fitness has given them that connection. Whether the architect should consider himself and be considered an artist or a business man; how he should conduct himself in one or the other, or in the dual capacity; what service he should render and how to make the world value that service; to what extent he should be responsible for the quality and result of his service; whether or not his acting as a builder would, after all, really spot his professional immaculateness; why he is underpaid; jealous tremblings lest the dignity of his profession be not recognized, while he squabbles about the extent to which he may himself invade its dignity—anent all these there is much clamor of tongues. And there is a real yearning for service, with complaint about being denied the rendering of it, that is at once noble and pathetic: noble, for desire to serve is one of the finest human urges; pathetic, since so much of it is futile. Why? Because it is divorced from reality; because it remains an emotional state, a kind of "wishful to be helpful" attitude that is amiable, but an infernal bore. Out of it all comes the sense of confusion, of a beating of the air, of the plaintive voices of those straying in the wilderness.

I shall not enlarge upon it, make no attempt to analyze it, for that would lead me too far from my subject. But one can hardly help asking whether the origin of the trouble does not lie in education, the education of which the teaching of schools is but a part, though a vital part; and if this be so, whether it is not demanded of us whose education by experience and environment is proceeding so painfully, that we should look very closely at the schooling to be given to those who with ardent hopes intend to follow in the path we have chosen for ourselves.

Lest it be thought that these remarks of mine lead nowhere, or that I am become the victim of some strange new narrow utilitarian beliefs, let me say now that I intend to show why I hold that contact with reality is necessary to the art of architectural design, and also to make at least one definite proposal about the manner of teaching. I can do these best, I think, by illustration; for that illustration I shall, instead of roaming over the wide diversified region of design and practice, confine myself to one phase of it only—all the better that it happens to be the one most forcibly insisting upon our attention today. But since this means great restriction, and since the phase is one whose utilitarian aspects are supremely important, I have an explanatory word to say first, about excluded matters.

I must, in great measure, pass by the region

of esthetics, as well as that domain of study which has to do with what flows from tradition —the history of the art and its styles; must largely ignore what we call the theory of design. This is not a choice imposed by taste, but by limitation of space and by the necessity I feel to attain the utmost clearness I am capable of. I may even seem to have some quarrel with esthetics; I have none. My quarrel is only with the confounding of the esthetic and the practical; with disproportionate, misplaced, false, unreal esthetics, which are neither agreeable or useful.

I can think of no department of education which, sanely and honestly pursued, should be more free from the danger of extreme theory and experimentation, of either the reactionary or the revolutionary, than that of architecture. It is an art and it is a science, and it is also, if you please, a business. It must be practical, however devilish the ingenuity of our striving to avoid it; our extremest indifference cannot keep it from being highly technical. It must, were it only to maintain its existence, be the product of the habits and desires, the needs and the resources, the mechanical devices of its day; these it may lead or be led by—it may not escape them.

On the other side, it must deal with style, which we might conveniently define as the application of constructive principles expressed in terms of orderly, logical appropriateness and beauty. And since it is beyond the power of human effort to invent anything so complex at any one time and as a whole, for invention is the new use or modification or extension of what is previously known, therefore the architect, part of whose task is invention, is obliged perforce to know all that he can of what has come down to him from the past. But it is not enough for him to know it in a merely superficial external fashion; his business is to understand it, how and why it grew, what it means—otherwise his reckless use of it may be something to make the angels weep. He is confronted with the study of history. I wish I might say something of that study, but again there is not room here. What, in this rough way, I am trying to suggest is that one may not unreasonably see this particular educational field as a sort of happy meeting-ground of whatever is best in both "Gary" and the humanities.

To come now to the particular subject under consideration, my plan is first to observe the way of the architect with an opportunity lately offered to him; next, the bearing of recent experience in the handling of that opportunity as a war-measure, and, then, to see what it all points to in respect of the preparation of the future architect.

For several years past it has become increasingly apparent that the living conditions of laborers outside the factories, their dwellings and their environment, were urgently in need of attention. From whatever standpoint the matter was considered, of human productive efficiency or human well-being and happiness, so long as the approach was honestly made, it became increasingly evident that the effect of these conditions was deep, far-reaching, and widespread, upon health, morals, juvenile delinquency, industrial unrest—in short, upon the fundamentals of citizenship in the case of those who by number constitute its bulk, while the inevitable reaction upon the more prosperous minority, though certainly grave, was hard to measure. It was also sufficiently plain that the conditions existing, though sometimes rising to a drab, joyless mediocrity, were mostly vile. It did not need the penetrating insight of supreme genius to discover that the prevalent housing of the working classes was a corrosive poison in the very midst of the republic; it did need an active interest and a knowledge of entirely ascertainable facts. It needed perception of the truth that people who live in squalor and ugliness that normally should and would revolt them, become, at last, blind to their surroundings and indifferent to them, except as to physical suffering, and even that they somehow manage to bear, but that the price must inexorably be paid, of filth, disease, sorrow, failure of education, brutishness, disorder, hatred, and crime; that the gentle ministrations of esthetic benevolence are superficial lotions applied to radical corruption. The divine marvel and mystery is that out of such awful culture-grounds there does come sometimes so much of beauty and aspiration, but for that indestructibility of the human spirit man may take no credit nor count it in palliation of his indifference and neglect.

Meanwhile the world was moving. Great Britain was at work and so was Germany. There was a stirring here; associations were

formed and held meetings, at which industrial housing and town-planning were discussed; the effect of living conditions upon Americanization was demonstrated; articles were written and lectures delivered; some actual housing work was undertaken, either directly by the industries or by independent organizations; one company in New York showed a most illuminating example of sound planning, advanced management, and healthy financial basis. Then the United States went to war, and the deluge descended. There is no need to elaborate the details of the story; it is familiar to all of you.

It is of the great body of the profession that I speak, not of the exceptional individuals, when I ask, Where were the architects? On the sidelines. What did they do? Well, nothing much that amounted to anything. When civic and professional societies convened to discuss the housing problem, they were not there. They were dimly aware of garden cities abroad, and really liked the pretty pictures, but did not look much closer. They shuddered at the slums and deplored the unkempt suburban ugliness, and, in the intervals of their debates about the ethics of advertising, they advocated the City Beautiful until the world rebelled, and then they worked hard for Civic Centers. Splendid monumental plan and design would elevate the public taste and teach the ignorant, the shiftless, and the indifferent that beauty paid. Social miseries were to be cured by the application of what a certain brilliant designer, himself the author of many a lovely colonnade, once called "Ironic colyumes." They felt that the dwellings of the proletariat were surely a problem; that it ought to be solved; they confidently hoped to get some of it to do—not that they knew much about it, but relied upon their old assumption that they were, *ex officio*, Admirable Crichtons, and hence, when the work came, would promptly learn all about it. They were members of that native school of optimism whose conspicuous exemplar is the late, but by no means lamented, Mr. Bryan, who assured us that overnight a million men would spring to arms. All over the country they saw endless cheap houses erected, how or why they knew not—it has been stated that our normal expenditure is something like a billion dollars annually—and realized that architects had nothing to do with them. They spent no little energy in moaning over the intrusion of their tribal enemy, the engineer, feeling him, and not unreasonably so, to be in the designing of appearance a barbarian, and in group-planning a joke, but seeing him, nevertheless, get away with the goods.

And what of all those elements and conditions which enter into the housing problem—those that make it a problem and those that carry promise of its solution—how did the architects deal with them? What did they know of the distribution of labor, its wandering wasteful shiftings; of the chaotic employment methods; of the equally chaotic ways of rental and sale; of labor classes and their earnings; of the relation between wages, rents, and sales; of the dependence of the small homeseeker upon that bloodiest fish that swims the financial sea, the loan-shark; of the ways of the real-estate speculator, of the speculative builder; of the distance that the workers could, or would, travel to and from their work, and how they did it, and what it cost them in money, and time, and fatigue, and what it cost the employers in diminished production and labor turnover? Did they know how the workman lived, how much he paid, and how it worked out for his family? Did they know how he and his wife liked it, or what they did like and would buy if they could? Did they know how much a proper cheap house, or a quantity of them, should cost? What they actually did cost? Did they know what were all the things that go to make up the cost of such a house? Did they know why industry-owned and -controlled housing wouldn't pay; why the worker would rent, not buy it? Did they know how and why philanthropy and paternalism invalidated so-called "model" schemes? Did they, I won't say know, but have even a glimmering of what the management of industrial villages means? How aware were they of a plan of management and rental that not only seems to be in very truth a model, but that pays all it ought to, and that provides, instead of a depreciation fund, one for the replacement of its buildings when they have reached the end of their economic life? Had they worked for housing laws, as distinguished from tenement and building laws? Had they proposed any system of loans such as the Federal farm loans? Had they tried to get groups of industries to back housing plans, for their own joint benefit, but under independent control?

I might go on; I have asked enough. The answer must be in the negative.

Evidently something was wrong with the architects; what was it? When we contemplate the great works of great past times; the triumphs of Greece and Rome, of Byzantium, of medieval France, it is easy to feel that their makers must have been a race of giants. Yet everything we know of man, of his nature and capacity, of what circumstances and environment will produce in him, tells us that such a conjecture would be sheer nonsense. Whatever men have done, man can do, and more. We have no warrant for supposing ourselves inherently incapable; we must seek elsewhere for the explanation of our weakness. I can find none better, all things considered—including the pertinent question whether the soil of industrial democracy, which produces no Pericles, no Mæcenas, no Lorenzo de' Medici, is fertile for art—than that which I have already advanced, of education away from reality. And we have, I think, one proof of it, a most reassuring proof, in the performance of these same architects, or many of them, when reality so impinged upon them that no evasion of it was possible. But of that a little later. In fact, it was part of the workings of the United States Housing Corporation which is the next item of my illustration.

This organization, created for the conduct of all the Government housing for war-workers other than that portion assigned to the Emergency Fleet Corporation, was, in substance, the assemblage into one great collaborative unit of all those branches of specialized knowledge and training which, in one way or another, are needed to treat a problem of congestion and labor turnover, whether by building or otherwise, in its truly manifold aspects. As description, this brief statement must suffice; it would take at least the full limits of my paper to give even a condensed account of all the parts and their functions.

For the designing of each housing development (projects, they are called) a Committee of Design was appointed, consisting of architect, engineer, and town-planner. They were chosen from private practice. They worked as a composite unit, the principle of collaboration being strongly emphasized. Indeed, experience so proved the absolute, unqualified need of this, that, shortly before the signing of the armistice put an end to new activity, a project being launched that would have been by far the greatest of all—Neville City, near Pittsburgh, that proposed the ultimate housing of perhaps 60,000 people—the following scheme was adopted. A strong committee was appointed, to have full charge of the work and to act somewhat like the directing committees of our World's Fairs, having authority to employ such other designers as they might consider desirable. Their office was established on the site of the project, and they were required to take up residence there, as also would be all whom they should add to their number. One definite injunction was laid upon them; that there should be only one common drafting-room, and that in that room all the designers must work side by side. Had Neville City gone ahead, I believe we should have seen something for all the world to come and admire. Upon the appointment of a Committee of Design, its members were very fully and closely instructed in the objects, principles, and conduct of the work, and given the extensive information that had been so painstakingly collected, digested, and elaborated in Washington. Now, as to their performance. First, the architects.

In view of the very limited experience this country had afforded, and with due weight given to the exceedingly trying restrictions imposed by war upon the use of building materials and to the abnormal costs arising from the same cause, taking further into account the numerous difficulties in the way of procuring good workmanship, it is my best opinion that what they have done will, as a whole, shed luster upon the profession and be a credit to the country. The general level is good; it rises sometimes to distinguished brilliance. No words of mine, moreover, can praise too highly the spirit of devotion so plainly shown in the unselfish acceptance cheerfully of but slender remuneration and in most arduous work. This applies to all, not the architects alone. I pay this modest tribute to my brothers with a full heart and deepest satisfaction, though the object of my remarks is neither to blame nor praise, but to seek lessons for our guidance in the task ahead. I do not, for I may not claim that we, meaning the Housing Corporation, have solved this great problem. We had not time. I do claim that we have shown the way to its solution, and that is

a long, long step ahead. And we have shown one thing as never before in our day has it been shown: the possibility and the value of collaboration. We have seen artistic collaboration, but never such a union of all the forces as have toiled together in this work for their country's service.

Of the architects, then, this must be said: their common difficulty was the facing squarely of the practical. Their job was intensely, remorselessly practical. Not one single item of delightful appearance but must grow from the hardest, sternest limitations of design and construction. Never before did the dollars have to be so carefully counted. Cost to build and cost to design; the control of their own office expenses; the avoidance of wasteful ways of making drawings; the accuracy of mechanical layouts and of specifications; the money value of speed; the clear understanding and statement of their accounts; the realization of *why* cost was so vital a factor and of what cost actually consisted, and what it meant to the result of the investment—all these were essential. And they were weak, there is no gainsaying it; their attack was not strong, clear, and direct. In contrast with this, in the sharpest kind of contrast, were our old friends, the engineers. Their approach to the questions within their province was never fumbling, hesitant, but always straight and sure. When they made an estimate it was as nearly complete and accurate as possible; it showed not merely the bare, detached cost of installation, but included the other elements of cost that the investor must reckon with. In the discussion of the reports of investigations, upon which the determination of projects was based, the comments and queries of the staff engineers were notably searching, practical, and pertinent. The expense accounts of the employed engineers were clear and understandable. To sum them up, they were a convincing demonstration of technical sureness and orderly habit of mind.

If, then, the propositions I have advanced are correct: that the architect was adrift upon troubled waters, trying, as it were, to navigate without a compass; that in a most severely utilitarian task he managed to achieve beauty under adverse conditions; that his success was due in great measure to his being strictly, sometimes even harshly, chained down to reality; that this reality was shaped and formulated by the remarkable collaboration I have referred to, and that part of it was the explicit contribution of the engineer, then it is pertinent to examine into their bearing upon education.

As this inquiry shapes itself in my mind, it suggests two somewhat similar branches, both growing from that same stem which I have called education toward reality. I can put forward nothing that will greatly help toward the composition of the long-standing difference between the architect and the engineer, unless it may be that each of them should try to become conscious of the extent to which the possession by him of what the other has would be to his great advantage. The application of the idea, in the case of the mature, must rest with everyone to determine for himself; its application to those who await their shaping seems to me clearer. At first blush it might seem to be the definite inclusion of engineering study in the architectural course, but though there may still be something to be said for this, I do not believe that it is the answer. To find the answer, we should ask what there is in the training of the engineer that produces the result we have just noted; for we must recognize that unless our youth had almost unlimited time and abundant personal means, even to give them the fundamentals of engineering science up to the point of its branching into specialization, would imply the sacrifice of too much that is essential to the study of architecture as an art. Then we should next ask what there is in the science of engineering that is necessary to be grasped by one practising the science and art of architecture, a field broader than that of engineering, including much of it, and requiring of those who cultivate it that they shall work with, coördinate, understand, criticize and control many specialists. The answer to our first inquiry will probably be, though I speak in much ignorance of engineering study, that the instruction of the engineer is not divided, as that of the architect so unhappily is, into an amazing and irrational separation of two interdependent things, even almost identical, that we know as design and construction. To our second query the answer will be that all that is comprised within the realm of construction, with its laws and principles, is the application of engineering science.

Therefore, it seems to me that from the very

beginning of the study of architecture—and I definitely include its history—every possible emphasis should be placed upon the unqualified integration of the theory and practice of construction with the theory and practice of design. The inseparability of the two should never be obscured or lost to sight; its presentation, in teaching, in discussion, in judgments, in the handling of school problems and theses, should be intimately and personally coördinated. That much of collaboration should be in the individual. The study of construction should be made as live, as real, as interesting as possible, and should include as much as may be possible of the fundamentals of engineering, rather than its more abstruse technicalities; how much this may be I very frankly do not know.

Let me repeat some of the reasons: That construction is an essential part of the very fiber of all real architecture; that since architecture is the art of building, the architect whose study and consequent bent is toward design as something independent of, or a sort of half-sister to, construction, is—forgive the vulgar pun—a paper sport. Construction, the fiber of design, is the essence of architecture, the very art of building, and should be the innermost self of the architect. Again, in the realm of all that specialization to which he cannot attain, he must use those who have; must understand and control and coördinate their work; the more he knows of its principles, the better he is qualified to do so. There is no honest architect but knows full well his deficiencies in this respect. Let us be honest. Last, and by no means least, is that which has so penetrated the minds not only of myself but many others in the service from which I have lately come: the direct, sure, competent, orderly habit of mind that the engineer's training evidently engenders. If the architect needs any one thing supremely, he needs this. And when he has it, we may look forward with some confidence to his entirely holding his own against the encroachments now distressing us, for he will be so much bigger and better and stronger than those whose successful invasion today is founded upon the assumption of an efficiency they do not fully possess, for they are too narrowly trained, too ignorant of the greater principles that real architecture includes and is founded upon.

Against the objection that to give any such amount of what may be called engineering study in an architectural course is impracticable, I urge this. There is probably no department of education that, as a result of the war's effect, must not be overhauled. The days of educational dilettanteism are, or should be, over. We have got to face those of far more constant and intensive study, of more effective teaching. There must be some way of reorganizing old methods so that the streams which now flow in separate channels shall at least partly unite. More than that: there is need for a fair constructive examination of those academic curricula of universities which will be followed by the study of architecture, to the end that they shall directly lead, rather than straggle, there. This probably means some conscientious work with courses in history and fine arts. And why should not the same thing be done with the secondary schools? Who knows of any expensive private school where a boy with artistic bent, wanting quite clearly to be an architect, can get anything specifically chosen to be of value to him in the program he must thereafter follow for a good many years?

For the exposition of the other branch I have in mind, let me imagine a school problem—always understanding that my narrow exclusiveness is because of lack of time. This problem, for a change, is not predigested; it does not assume that some magnificently wealthy patriot intends to erect a palace for visiting imperial and royal exiles in a public park, and that the Corinthian order is appropriate. It has been preceded by certain visits to such places, say, as Bridgeport and Quincy; the plants and the housing and their relation have been discussed. There have been some talks to satisfy the interest aroused in the students, by a town manager, an industrial engineer, a town-planner, the representative of a housing association, others; the subject has become real. There have been some exercises in the design of factories as an esthetic problem. The small house and industrial town plans, here and abroad, have been studied. The problem, in its first stage, is presented in the form of an adequate map of some vacant property, accompanied by a statement of the facts relating thereto that are germane. First part of the exercise: say what should be done with this property and give the reasons why, and something of how. I said

the problem would not be predigested, but it is, to this extent, that all the indications given point to one logical solution; it may be even still further so in detail, according to the length of time assigned to its treatment, its extent, the maturity of the class, the judgment of the instructor. Those are details. First credit: for the answer, and the understanding exhibited in making it. Second stage: design the development.

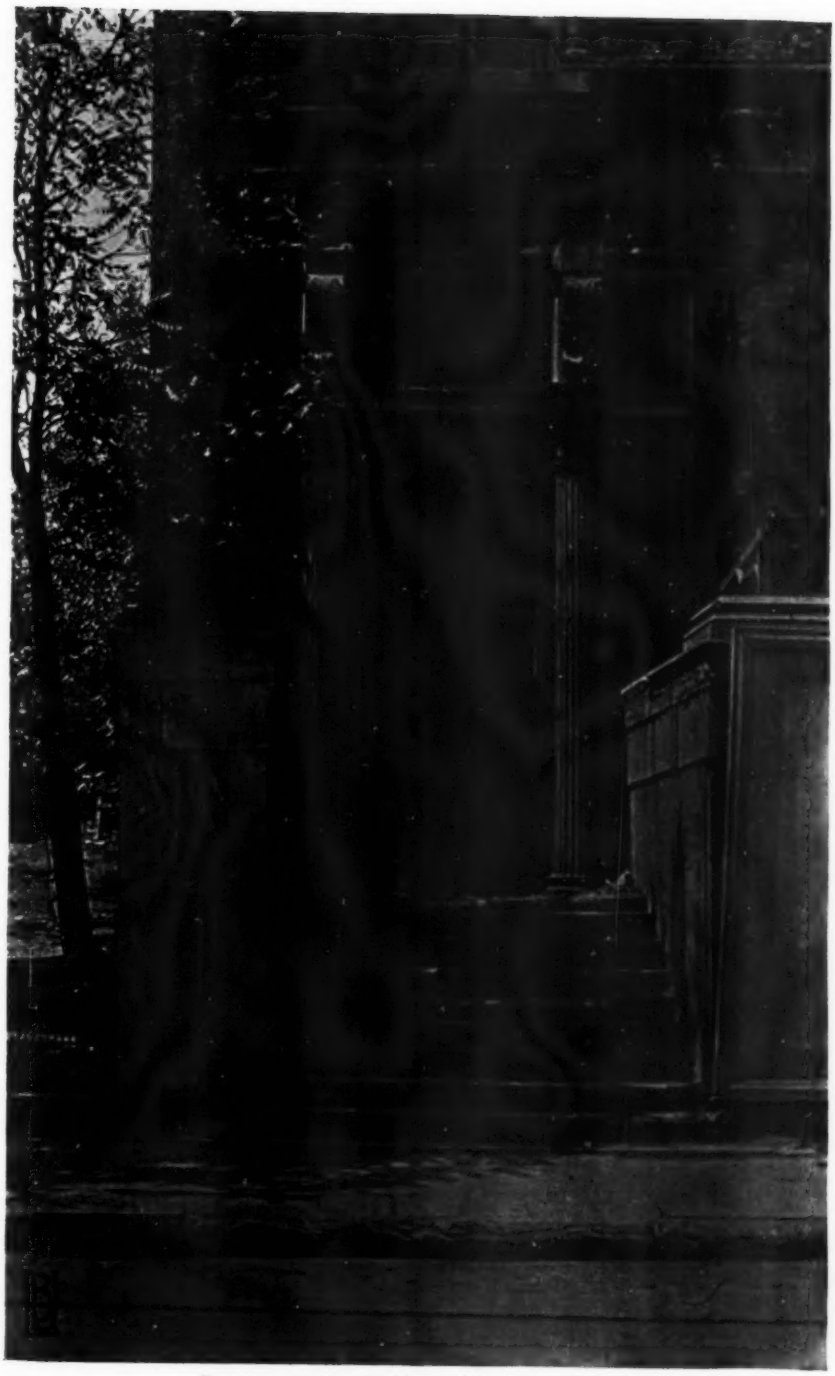
I submit that, however crude the showing—and it might well be pretty crude—there would have been here an exercise of intelligence and live interest; that there would have been the direct contact with essential facts and life such as we must all deal with or fail as men and as workmen; that the processes of reasoning would have worked naturally from cause to effect, from the inside outward; that this would be education toward reality. We would do well to project our gaze forward and try to discover what that reality means. We have lived through the days of trifling with the inanities of the "city beautiful;" of a poor misunderstanding of town-planning as a thing of physical facts and arrangements only; we have emerged into the wider comprehension that tells us it means no less than planning for the very lives of men. It is not the mere planning and building of streets and parks, schools and dwellings and gardens, of their embellishment and the provision of the public conveniences we call utilities; it is the terms on which, the ways in which people, old and young, will travel and traffic in those streets, play in those parks, study and teach in those schools, dwell in those houses, cultivate those gardens. And it is how they may, and shall, cultivate the other garden, the garden of the mind and the soul, the garden that is in every human being, humble or exalted; the garden whose individual state is, we are learning, the common concern of all.

This planning may not be the work of any one class, or group, or profession; it requires the concert of all the constructive forces of the community; in it is work and to spare for each one who has anything real to contribute. The effort it must make is not merely one against the inertia of prejudice, lack of vision, the *laissez-faire* tendency, but it implies warfare, the waging of battle against active forces of greed and selfishness. At this very moment, when the din of patriotic enthusiasm still fills the air, we already have the proof. Hardly was the ink upon the armistice dry when a scheme was plainly disclosed, so cynically regardless of every single thing for which men have suffered and died in this war, that only the most sinister motives can possibly underlie it. Its aim is the total destruction of every forward-looking aspect of a great governmental undertaking, to the obvious end of affording a lucrative opportunity for personal gain. These vultures, with the sure, keen scent of their obscene hovering species, smelt the appetizing carrion that was to be, while it still walked alive. With patriotic flapping of their filthy wings, they soared magnificently in the company of those whose souls were white, their sharp eyes watching all the while without a waver the approach of the hour of dismemberment. It is such as this that is to be fought, not only now but until the coming of a day we cannot foresee. It is to be a part of the army that must wage this battle in the days of peace, a working part, not fluttering on the outskirts, that I would see our young men prepared.

I know there are difficulties; there is one plain enough. To accomplish any such program as I have so hastily sketched, you have got to have as teachers men of special and perhaps unusual attainments and experience in greater numbers. That means money. I count all that as nothing. Once you have clearly made up your minds to what you propose to do, and are able as clearly to present it, the rest will follow.

There is the difficulty, a very great one, of the arrangement of available time. As to this, I can only suggest that if the promise of such a plan is great enough—and I do believe that it may well be—then the arrangement can somehow be devised.

Gentlemen, all about us we can see a people rushing to avoid the lessons inculcated by the most searching, terrible experience our civilization has ever known, striving to forget, to dodge their responsibility, to go back unscathed to the old selfish, thoughtless ways. We may, perchance, be able in a measure to do this for ourselves; but, by all we hold dear, let us not close our eyes to what lies before the coming generation, not shirk our duty to those who must pay the bills run up by any incompetence or cowardice we may show.

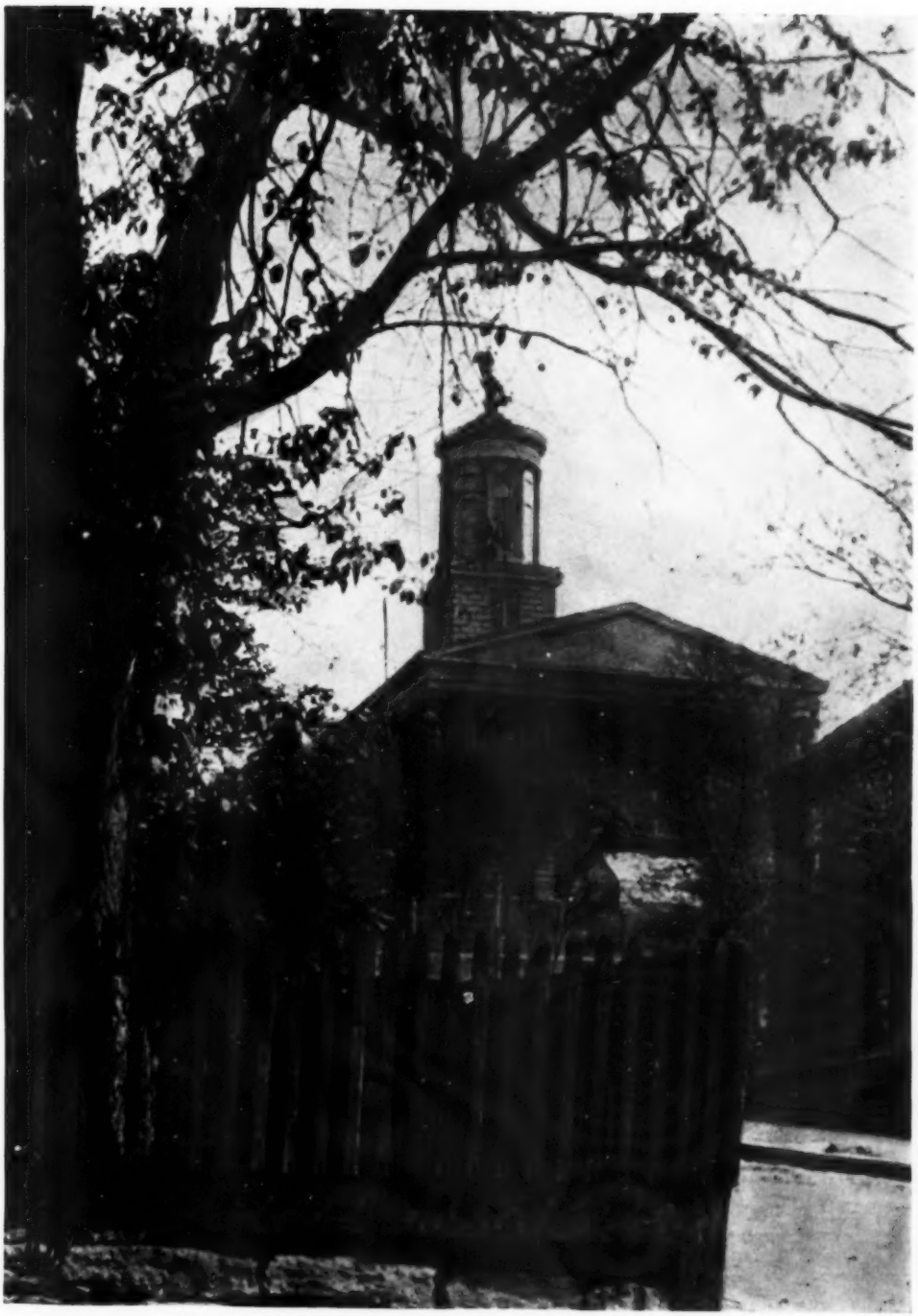


DOORWAY OF RUINED HOUSE, NASHVILLE, TENN.
Photograph by Ben J. Lubschez

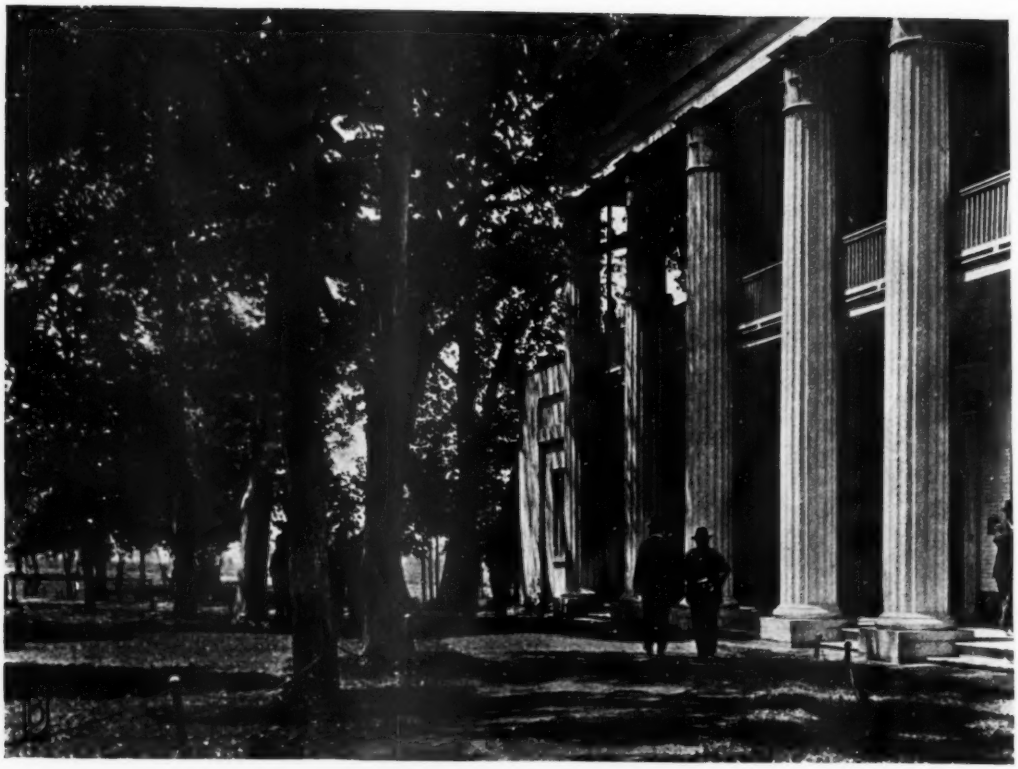
Avenue of Cedars, The Hermitage, Nashville, Tenn.
Photograph by Ben J. Lubschez

SIDE PORTICO OF THE CAPITOL, NASHVILLE, TENN.
Photograph by Ben J. Lubschez

The Capitol Front, Nashville, Tenn.
Photograph by Ben J. Lubschez

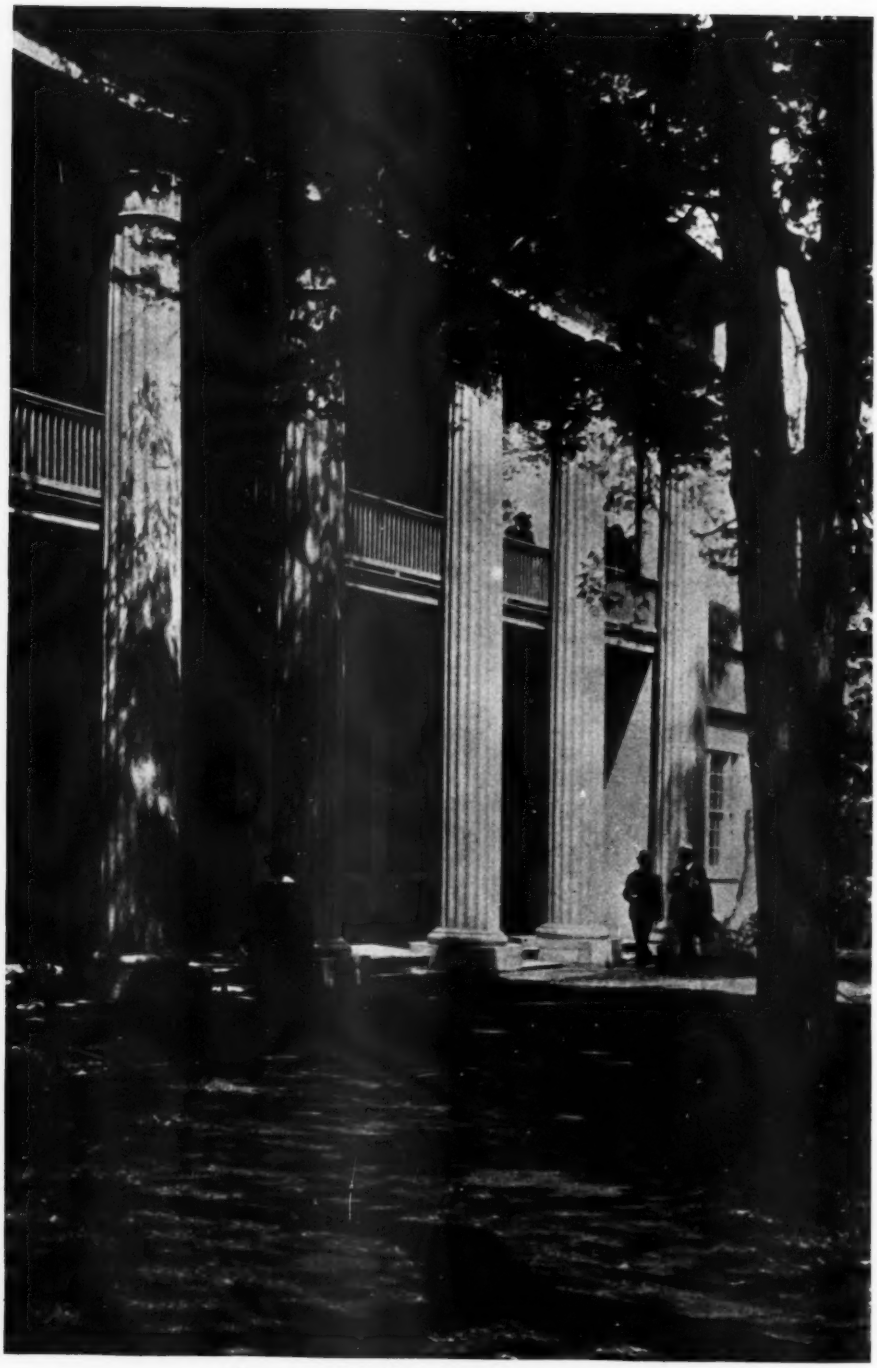


A Glimpse of the Capitol, Nashville, Tenn.
Photograph by Ben J. Lubschez



THE HERMITAGE, NASHVILLE, TENN.
Photograph by Ben J. Lubschez

Tower of the Capitol, Nashville, Tenn.
Photograph by Ben J. Lubschez



Portico of The Hermitage, Nashville, Tenn.
Photograph by Ben J. Lubschez

A Solution of the Housing Problem in the United States*

By MILO HASTINGS

PART I. THE SOCIAL PROBLEM

THE housing plan here offered has obvious kinship with the English garden city. It is differentiated from the English plan to adapt it more closely to American conditions and needs.

The American possesses no overwhelming fondness for ancient and established forms of dwelling architecture. If, in our house-building and community-planning, any practical comforts and modern conveniences be sacrificed to the ancient European cults of rustic beauty, the American tenant is going to repudiate our efforts as mere artistic foolery.

The American does possess a contrasting fondness for labor-saving inventions and "modern improvements," and places a value thereon out of all keeping with European standards. He wants things up-to-date, and is willing to pay for modern features of housing conveniences and comforts out of all proportion to their actual cost. In the Flagg workingmen's apartments, in New York, the belated installations of baths permitted a raising of the rents on a scale that paid a hundred per cent on the cost of their installation.

Nor do American working folk, and particularly the women, take kindly to those ancient ideals of thrift and economy that, in song and story, hover about the lowly peasant's cot. They want neither cot nor cottages, but houses and bungalows. They do not want to carry market baskets nor sit before open fires. They like to get out and travel and go to shows. They want an auto and a garage; they want hot water and steam heat, a telephone and goods delivered—preferably "in the rear."

Since the American scale of values is different, we should translate the lessons that Europe has to teach us into American terms, and plan our housing so as to give the American the greatest possible measure of those things he wants and is willing to pay for.

The American does want a private house and suburban or country life; but he also wants city conveniences. As things now stand, it is difficult to give him both at a price he can pay. Our problem is to devise a plan that will give the worker a private house and a garden, together with coöperative utilities and services, and at a total cost within his means.

This is an end that cannot be attained without some sacrifice of the picturesque freedom of the plotting of the present conventional garden city. There is no intent here to discard the esthetic values of artistic irregularity, but only to compromise the ideals of the landscapist with the practical limitations of the engineer.

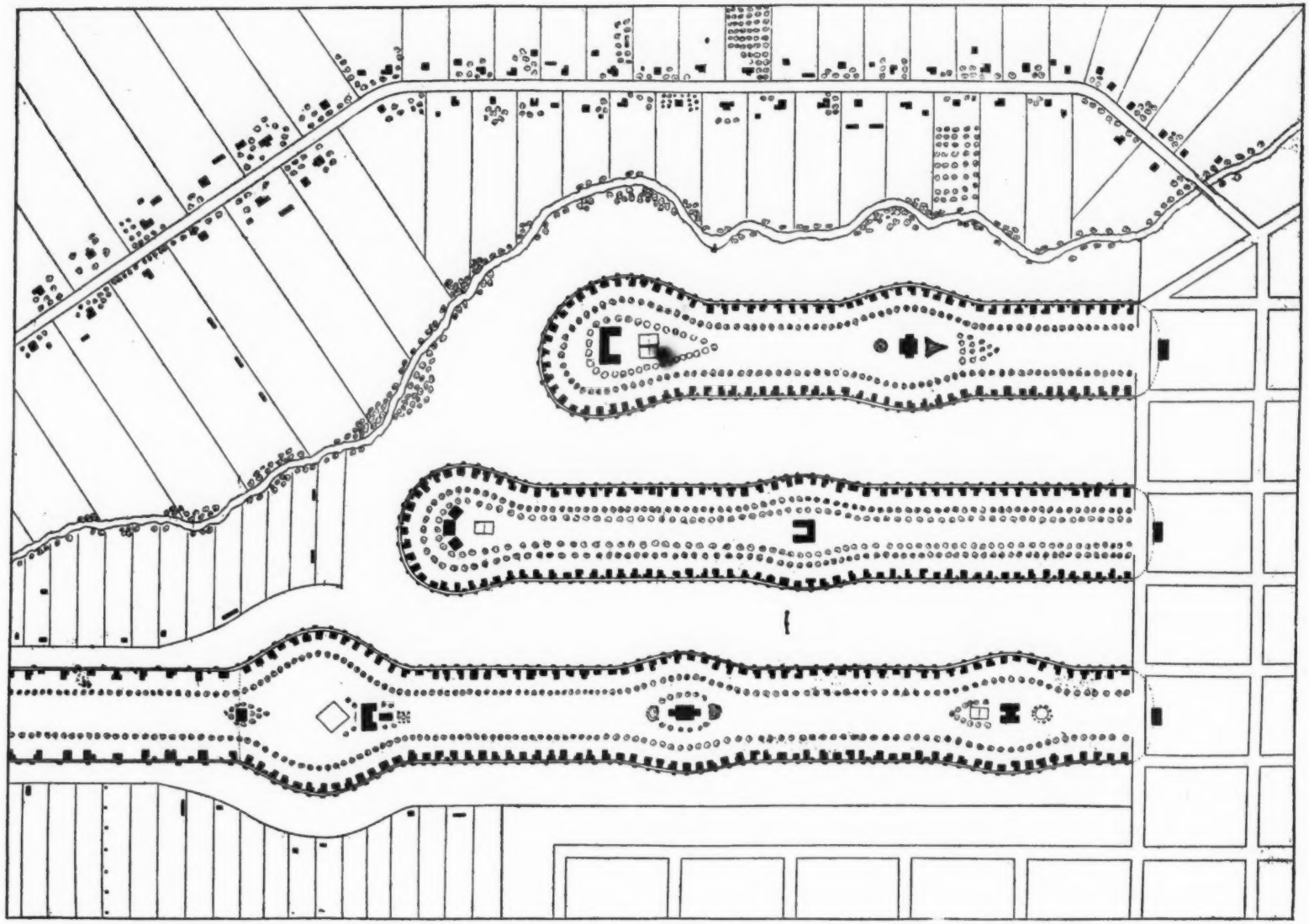
A Street That Functions Efficiently

The varied ends sought, and proportioned to American tastes, can be most economically secured by building a series of detached houses along a line of service utilities. Our present street is such a line, but it is not an efficient line. If it be narrow, or the houses be set too near the street, it is cramped and ugly. If it be wide and spacious, and the houses set well back, it is unduly expensive, and the total amount of pavement and total length of digging and piping to carry the utilities into the house is too great.

We can gain economy by a specialization of the functions of the street. We can broaden the street that is to be the front of the house until it is no longer a street but a parkway. We can concentrate the heavy traffic and service utilities at the rear of the house until it narrows down to the one-way vehicle track made of two concrete rails with concave surfaces fitted to the gage of an ordinary motor vehicle. The construction of this "auto railroad" will require but a small part of the material needed for the modern street, yet the service rendered will be more efficient.

Paralleling this track, and constructed as a part of it, will be the line of service-pipes and cables. The minimum list will include the water-line, the sewer, gas, telephone, and the light and power circuit. The sewer must be buried in the ground and sloped for gravity flow.

*One of the two winning theses in the competition instituted jointly by the Journal of the American Institute of Architects and the *Ladies' Home Journal*.



THE COMMUNITY PLAN SUBMITTED BY MILO HASTINGS IN CONNECTION WITH THE WINNING THESIS PUBLISHED IN THIS ISSUE, SHOWING THE U VARIATIONS, THE BACK SERVICE STREET, THE PROVISION FOR REAR GARDENS AND THE OPEN AREAS ON WHICH ALL THE HOUSES WILL FRONT

Water-pipes must be buried, not only to prevent freezing but to cool the water in summer. Where no heating-line is to be provided, it may also be necessary to bury the gas-pipes to keep the collected water from freezing. The wire cables may be located in a groove on the side of the concrete rail, and so be more available. But if central heat is to be provided, a conduit made of sections of asphalted concrete boxes may be placed above the ground-level. By this plan it will be possible to keep insulation dry and there will be less heat lost to the air than to the better conductor, the damp ground. Where such a surface conduit is used, all pipes and wires, except water and sewage, may be carried therein. This heat-carrying conduit will pass just beneath the floor at the rear of the house, and, if there be a garage, the heating conduit may also pass through it just inside the rear wall. Thus, the heat radiation from the main will not be wholly wasted.

Rear Streets versus Front Streets

This compact service-way should be located at the immediate rear of the houses and the houses aligned thereto. This line need not be rigidly straight, but it should avoid unnecessary windings and sharp turns. While rigidity of alignment in the rear is essential to efficiency, in the front there is no rigid house alignment. We avoid the straight and narrow way of the city street, not by winding and curving it, but by substituting for the street a sufficiently wide parkway to permit of variations within itself.

The rear service-line is for utility traffic. It makes direct contact with the rear room of the house. Here all goods may be delivered into a trap or chute without the deliveryman alighting from his car—often without his stopping. Garbage and waste paper, set out through a wall-trap, are collected with like dispatch. The car on such a track needs no guidance, hence the extra man now often required may be dispensed with. Such superior delivery to the house, in addition to the direct economy, will stimulate all manner of coöperative effort. Functions like baking and laundering should, in such a community, become completely centralized.

The community kitchen, which has made great strides during the war, requires only a more efficient system of house-delivery to make it a permanent service in the industrial community.

With all modern utilities in the home and this aid toward the centralization of the few remaining functions of housekeeping, women will be so freed from home labor as to greatly increase their capacities for industrial labor outside the home. While woman's participation in industry is not without its evils, the nation must find other ways of correcting these evils than by refusing to accept labor-saving methods of lightening household drudgery. Opposing the centralization of housekeeping functions is quite as stupid as the opposition once shown to linotypes and grain-binders.

This tradeway or service-road is not for beauty but for utility. By making it virtually an automobile railway, speed and service will be enhanced. By more efficient transportation for goods, we make possible a greater decentralization of population and gain access to a greater area of land for recreation and cultivation.

As we cannot have service without an intrusive proximity to the dwelling, we want this service concentrated so that it can be better hidden. The rear of the house, and often a garage, together with a garden-house and tool-shed, will half enclose this line. We have but to connect up these buildings with a few concrete posts, stretch a substantial woven-wire mesh, and plant climbing vines, and our service right of way is fenced off as securely as an English railway. The house door into the traffic-way, required only for the delivery of large articles, can be kept bolted from the outside. Thus child-life will be safeguarded and speed may be unrestricted. Access to the garden lands in the rear would be by means of a platform extending from an upper porch out over the narrow service-way and an outer stairway descending into the garden space beyond.

Gardens, Parks, and Play-Spaces

For commuting suburbanites or industrial workers, the garden-patches should not be fenced. A narrow strip near the house may be reserved for outbuildings and for a few fruit trees or perennial crops, like asparagus. Leaving the remainder of the garden land unfenced will permit of economical coöperative plowing. Division lines may be determined by sighting through between landmarks, and thus wasteful and weed-breeding fencerows may be avoided. Where the holdings are of larger size, a nearby

strip can be left for coöperative plowing and the land beyond be fenced for chicken-yards and cow-lots. In such developments, many tenants would require the smaller garden holding only, and the larger space beyond could be leased to those desiring them.

As the concentration of houses on the service-line is essential to gain coöperative utilities, so the extension of the land in the opposite direction will gain greater areas for cultivation.

Our logical housing unit will be formed of two approximately parallel lines of houses. Connected at its outer end by the return bend of the service-line, the unit will form a U. At the open end of this U is the established city, or, if all things are to be new, the industrial and trading area of the new city. The inside of the U will be parked throughout and traversed by no heavy service traffic but only by such walks and light roads as are needed for recreational purposes and private cars.

Within this U, with its park-like and non-commercial environs, may be located schools, clubs, athletic courts, and other social and recreational institutions. But the social value of this land will not depend upon its elaborate equipment; its primary purpose is to give a sense of room and freedom and to provide ample play-space for children. If it be nothing more than an alternation of groves and grass lands, with an occasional school, it will well serve its purpose of giving the residents a free recreational common, which is often absent, even in suburbs where all land except the street is fenced off as private grounds.

The length of this U is indefinite. Where the land is available for possible later expansion, the outer end of the U should not be built up with houses, but should merely carry the service-way and utility pipes which may be moved further out in case of expansion.

Economies in Construction

The construction of the houses themselves, being planned and built in considerable numbers, will gain the economies due to wholesale building operations. In the recent Australian rural communities these wholesale economies are reported to have reduced the housing costs to one-half that of individually built houses. In the present plan, the coöperative utilities will necessitate a standardizing of heating equipment and similar fixtures that will show the usual economies of standardization. Our progress in pouring cement houses indicates further possibilities of economy. Such economies necessitate similarity in the finished houses. We accept similarity in automobiles because of economies, and there is no reason why we should not accept it in houses. But if the whole effect of the house and its environs is cramped, monotonous, and ugly, we can pay too great a price for economy. The solution is to accept a larger degree of repetition in house design and fittings where the economies are greatest, and to secure a compensating variety and beauty by the freer use of land in the parkway.

Decentralization of Population

In the model English garden city of Letchworth there is a population of 35,000 on 4,500 acres, or about two-thirds of an acre per family. And yet, in Letchworth, twelve houses are permitted per acre, which, with a lot 150 feet in depth, would mean only 24 feet in lot-width. In this much-famed English model, the cramping of houses is thus permitted in the town, which is then surrounded with a belt of municipally owned farms. The outermost acre of Letchworth is only several miles from the city center. Such a distance can be negotiated by a jitney bus in ten minutes at a cost of two or three cents per passenger.

We can well afford to discard this Letchworth farm-belt and distribute our people over the whole of our land. After allowing for the space for industrial needs, we will have a land area a little better than a half an acre per family. This must be proportioned between the park space, the building and private yard, and the garden space in the rear. The houses on the two sides of the U contribute equally of their allotted space to the central parkway, which should be at least 200 feet wide. Allow another hundred feet for the private lawn and house-site and 200 feet for the garden. The total depth is thus 400 feet, which will result in a lot-width of 60 feet.

Central Heat and Hot Water

This is a far greater decentralization than is gained in the English garden city, yet in order to have central heat for every house, we have only to provide 60 feet of heating main. We have not done this thing, but the reasons are

not found in the textbooks of our heating engineers, but merely in our unsocial planning. The distribution of heat and of hot water for bath and kitchen use may be combined. Such water could be rapidly circulated by pumps and the pressure kept up, if need be, by a relay of electrically driven centrifugal pumps out on the line. The cost of power for such forced circulation should be more than met by the economies in coal cost from more efficient heating at the central plant, and thus yield as a net gain the advantages of the cleanliness and comfort secured and of labor saved by a hot-water supply and the hot-water heat within the home.

The original cost of our conduit and its piped utilities will be offset by the elimination of individual house-heating systems and the saving of the cost of a cellar beneath the house. The present uses of the cellar or basement are for the location of a heating plant, for a place for keeping food cool in summer or to prevent its freezing in winter, and, in some modern cottages, as a location for the laundry. In the present plan none of these needs appear.

Where heat may be piped, so can anything else that flows by pipe or wire. Sixty feet of vacuum pipe will cost less than an individual vacuum sweeper. Why should the worker's wife sweep with a broom and dust with turkey feathers when the expenditure of a few cents a month for electric energy will save her an hour of work a day and rid the house of dust-carrying disease germs? Again I am constrained to believe our nineteenth century sociology and not our twentieth century engineering is at fault. Why should we go on building workers' houses with a hot-water tank on a kitchen range and put bathing on an uncertain schedule?—for men will bathe where hot water is always on tap and will not where they have to go down in the kitchen and fire up and wait an hour in order to get a hot bath. Why should we pile up the responsibilities and labor of decent living when it is cheaper and easier to make living easy?

We always approach this problem of housing from the standpoint of an eleventh-hour rush to get roofs over the heads of a multitude of workers that the sudden growth of some great factory has herded into insufficient quarters. For such needs, a scale of density of population like that of the garden city is as near what we want as we can now determine it. But, as our social control over industry grows more intelligent, we will cease to let these huge factories dictate the density of our living and begrudge us more than this arbitrary minimum of soil.

The Workman and the Land

We have a presentiment—and all Utopians that ever wrote have strengthened it—that in the future more of us are going to possess landholdings somewhere between the 160-acre farm and the ¼-acre garden, and that agriculture and industry will be more closely interwoven than now. Time and intelligence now at work will surely intensify agriculture and teach us to grow more food from less land; improved transportation will bring us closer together in minutes and in dollars, though farther apart in miles; the distribution of social utilities will make life comfortable, though removed from the city throngs.

To accomplish these ends more speedily, we must concentrate our houses on a line to gain the advantages of better transportation and more coöperative utilities, and extend our land back in strips at right angles from the line of houses to gain access to more soil. The maximum of house concentration is the continuous house of the Chambless Roadtown plan; the minimum is the present arrangement of farmhouses.

There is no absolute standard for the determination of compromises between these extremes, but the range included by the plan here offered (the essential idea of which the writer published in 1909) is that beginning with the detached house and ending with the distance at which it ceases to be feasible to pipe water. Between these extremes I believe may be found the most acceptable and economical housing plans for industrial population in areas where it is feasible to provide gardens, and also for those intensive agricultural communities where vegetable, fruit, and poultry farming are the chief industries. Within this range of population density will be included the equivalent of our present suburban and village life and all of our plans for agricultural holdings in industrial regions. As we repudiate our present congested metropolitan life, and as the wasteful processes of extensive agriculture are restricted, this middle ground in the ratio of men to land may come to include a major portion of our whole people.

Picture now our plan applied to a semi-agricultural development with holdings of from 2 to 10 acres. The houses can be spaced from 100 feet to 100 yards apart. We shall cease to fence in our tradeway and shall probably lose our piped heat and vacuum, but we can retain a superior delivery service and our electricity, gas, and water—perhaps the latter with enough capacity for garden irrigation.

Our little lands will extend for 1,000 feet or so to the rear. The residents who are otherwise engaged will retain only a nearby garden-patch and sublet the rear portion of their holdings to land-loving neighbors. If our community has retained the U formation, there will be from fifty to a hundred families to the mile, and we may have good schools, social clubs, and coöperative recreational facilities. With auto bus service our people may go 5 to 10 miles to work or to trade with no undue expense or loss of time.

But this last picture need not mark the maximum of decentralization. We can give up the central parkway, combine our pipe- and transitway with the free vehicle road, and alternate our houses on the opposite sides, place them 100 yards apart, and carry our tilled lands back a mile, and our meadows, small grains, and pastures another mile, and we will have an average farm size of 600 feet by 2 miles or 150 acres, which is entirely too much for the farmer of the future. Far from being inefficient, the long field of such a farm would be better adapted to economical cultivation than the square field, for less time and space are wasted at turns. The square survey of American farms is unadapted to an age when the delivery truck, the pipeline, and the power wire mean more to men than the vaunted isolation of feudal castle or plantation home. By applying our principle of the line concentration of living to our farm-survey, we would secure, economically, good roads, electric light, rural delivery of goods from city stores, a bus line, water, sewerage, and gas to cook with if we want it, and neighbors just out of earshot.

So much to show that there is really no limit to the application of the principle, but the immediately practical application is not to general farming, except, perhaps, to newly reclaimed lands. The most urgent need for housing is for our industrial workers; and our aim should be to give them as much land as they will use, and give them also a detached and private dwelling, and yet deny them none of the utilities available in apartment or flat.

There is a time, on Sunday afternoons, when we appreciate curved drives and winding paths, and for our play-place and playtime we set aside the parkway in front of our houses, but, in building the houses and supplying them with service, mere beauty must compromise with efficiency. The aristocrat lives fronting on the park and has all goods delivered in the rear, and so can the democrat if he will quit being an anarchist in his town-making and house-building.

PART II. THE ECONOMIC METHOD

The Menace of Landlordism

Our existing system of American land-tenure grew out of our plan of turning over our public domain on easy terms to land-owning farmers. By so doing we thought to establish a sound and enduring democratic tenure. The result of this system, in its present state of evolution, is that the modest fortunes of a large portion of our people are founded on the unearned increment from the rise in the price of real estate, and hence it is extremely difficult for us as a democratic people to now repudiate the system.

But our much-lauded and fondly worshipped land-tenure system is not an enduring one. It is the favorite criticism of misunderstood socialism that if we divided the world's wealth equally today it would be unequally divided by tomorrow night. That is what is happening to our American land system, for our intended democracy of private ownership, founded on homesteading, is gradually but surely being lost through the irregularities of inheritance, the rise and fall of fortune, the increase in land-values and the big fish eating the little ones. Landlordism and tenantry is the sure but inevitable outcome.

We boast that our own democracy means, not equality, but equality of opportunity. But there can be no equality of opportunity for the newborn in a nation where lands are no longer free and where a portion of the population live off of the socially created rental values of land.

[NOTE.—For the statistics covering the growth of landlordism, and the diminution of home ownership in the United States, the reader is referred to "The Housing Problem in War and in Peace," published by the Journal of the A. I. A.]

Government Control Necessary to Prevent Congestion and Slums

We can go on dodging the issue and leaving the disinherited unborn to right it as they may. But while we may not be ready to apply a land reform to our general farm holdings, the time is at hand when the land speculator can no longer be allowed to congest our cities and absorb the surplus earnings of our workers by the increment of land rentals. If we would extend towns and cities or build new communities on a socially conscious plan, there is no use going about the business except on some basis of federal, state, municipal or community land ownership which will save for the community the wealth the community will create.

Under the urge of war, England, goaded by a land situation worse than our own, achieved a sudden radicalism which goes further than we may desire to go. The land for English industrial war towns was not only condemned at pre-war prices by the Government, but provision was made that adjacent lands might thereafter be condemned at pre-war prices. A fairer plan would be to give the public agencies active in housing enterprises the right to condemn the lands needed at present values, and the right to condemn further lands when the need arises at values to be determined by their worth at the time the project was founded, plus such ratio of increment in value as the regional or state records show as having accrued in lands of similar type but not effected by proximity to industrial communities.

Who Shall Build Our New Communities?

But we must not only decide what to do but who is to do it. Town-planning by individual private enterprise is ruled out because it breeds congestion and slums. Town-planning by private development companies may be fairly satisfactory for the middle-class suburbanites, but it has utterly failed to properly house our workers. Town-building by industrial corporations, who are forced into such enterprises by the necessity of housing their workers, is somewhat more efficient and is the prevailing method in present-day building. Such corporations employ the best of our town-planners and small-house architects, and these men work from the employer's point of view. Comfort and efficiency for labor they consider. But to build up communities wherein the landlord and employer are one and the same corporation is to accentuate and perpetuate our present overgrown industrial feudalism. Democracy will not thrive in these corporation towns where the water from the taps and from the eaves is flavored alike with steel or rubber, or shredded wheat biscuits, or a certain brand of soap.

But somebody must be the landlord; if not the private speculator or the industrial corporation, then it must be the government. But what government? Federal, perhaps; state maybe; best of all, the local government of the district. The community should own itself. The unearned increment must pour into some pocket, and if it be the pocket of the community, then taxes may be deleted and the community enriched beyond the dreams of publicans.

For the expansion of existing municipalities, the right of the eminent domain of the city must be extended, not only to its streets and rails, its pipes and wires, but to its houses, yards, and gardens. Nor should this expanded right of domain be confined by existing corporation limits. If we would solve the house problem, we cannot wait until the adjacent rural region becomes half urban; we must have power to reach out into rural territory and do our planning and start our building on fresh ground before private suburban development ruins all hope of doing it well.

The Need for Broad Planning Programs

The sharp political line of demarcation between city and country is a serious difficulty in the development of semi-rural communities. No such line exists in the nature of social or industrial life. As it is at the very point where town meets country that our greatest opportunity exists, we will need some well-wrought plan of coöperation between the municipal and the adjacent rural government. Such developments cannot always be left to mutually jealous local governments, but will require oversight by the state to permit of harmonious town- and country-planning. In such localities it may prove necessary to create new communities occupying a portion of both the old city and adjacent rural territory. Such areas might be incorporated in

the old city, with local autonomy in the business of land proprietorship and housing control.

Our governmental authorization of an eminent domain for housing must also be extended to new communities that may be created apart from existing cities. For the initiation of such new efforts we cannot depend upon the initiative of centralized governmental authority. The initiative is more likely to come from enterprising citizens or industrial leaders. But the overseeing government must have power to check and supervise such ambitious efforts. As the Reclamation Service now selects from among endless local claimants the regions to be improved and made into farms, so we must have a state or national agency which will pass upon new town projects and extend authority where worth is found.

Money and Credit

In securing the funds for building we will have a like need of such aid from the larger political organization. In the reclamation projects, the acquisition of the land is the smaller half of the problem. The Government finances the improvements and secures the return of the funds invested from the wealth thereby created. In like manner, the nation or state must finance the public utilities and workers' dwellings of new industrial communities or we will make slow progress with our housing problems.

This is a safe investment for Government credit. To issue Government bonds to drain swamps or build cities is not to pile up debts like those of war, but is merely a governmentally directed coöperative investment in real estate securities. Private capitalists would otherwise finance these ventures on speculation—some to make and some to lose. Through the agencies of Government credit, individuals pool their capital, their gains and losses, so that all will make 4 per cent. As long as we need houses to make our workers productive, bonding the Government to pay for these houses means adding to national prosperity.

Self-owning Communities

The land bought, and the houses built by Government funds will be owned by the community, the Government holding the mortgage. Before the war we would probably have sold out the homes to the workers on easy payments and so made trouble for the next generation. But the war has increased our social reach into the future, and we can now advocate a permanent community ownership. The Government bonds may be retired in twenty or fifty years—the time is not particular, though the community should take the ultimate risk of its own life or death, for it is the community that will be responsible.

The community will own itself and will rent its houses on long-time or indefinite leases to its citizens. The rent figure will include interest on the cost, the upkeep, and operation of the town as a whole, and, until the bonds are retired, the sinking fund for such retirement. The citizen will own his own home for all the practical purposes of vine and fig tree, and, if you please, of an ancestral estate. The most prickly thorns on the rose of inheritance are removed when we do away with private property in the unearned increment.

Whatever be the relations worked out between our complex national, state, city, and community organizations, the new communities that are based on the community ownership of land and houses should have the largest possible degree of local autonomy. The political problems of such a community are different from those existing under the old system of land tenure, and the affairs of such communities are not likely to be fairly administered by outside officials influenced by the old system. The new communities will form centers of a more social democratic life. If they prove efficient they will grow and expand, and so they in time recast the social structure of the whole nation. Present danger lies in subjecting them too closely to outside paternalistic influence and thus checkmating their opportunity to prove their actual worth in competition with the old system based on the private ownership of land.

[NOTE.—Among other references, the reader's attention is called to the new Housing Bill in Canada, a summary of which appears in this issue; to the new Housing Law in Australia, likewise summarized in this number, and to the pending law in England, of which many references have been published in previous issues of the Journal. The English Law is not yet on the statute books, and it is generally conceded that it will be wholly ineffective in meeting the present grave crisis, unless it be accompanied by a Land Acquisition Act that will permit the taking of land at its pre-war value, and not compel the Local Authorities to buy it at its present greatly inflated value. EDITOR.]

Post-War Committee—English Opinions

IN THE last issue of the Journal we had occasion to call attention to the Professional Problem in England, where the future of architecture is being discussed by the organized societies, by the practitioners, and in the press. Of particular interest is the contribution by Mr. John Murray, F.R.I.B.A., made in a letter to *The Builder* in which he takes occasion to chronicle the opinions of a number of the past-presidents of the R.I.B.A. These were collated in the year 1892 by Mr. William H. White, F.R.I.B.A., and secretary to the R.I.B.A., in an essay entitled "The Architect and His Artists." From this essay, written in 1892, Mr. Murray quotes as follows:

"The architect is still tossed upon a sea of precedents, still a prey to the newest archæological affectation and phase of artistic fashion—not a faithful recorder of the spirit and history of his own time; and at the eleventh hour of a long period of historical revival, he is agitated by counsels which, if accepted, would place him on a level with those whom he should employ as his subordinates. Here, perhaps, I may be allowed to explain that in treating the subject of the architect and his artists, I am not using the word 'artist' in the exclusively æsthetic sense in which it is now understood, but in the sense of a handicraftsman.

"In western Europe, during the mediæval period, the names of artists engaged in the construction and adornment of cathedrals and other buildings have come down to us, but the architect as we understand him is conspicuously absent or non-existent.

"There have, however, existed such offices as architectus and ingeniator, or ingenarius (corrupted to engineer) supervisor (corrupted to surveyor), magister operum, and clericus operationum, devizor, master-mason, and other appellations distinguishing persons who had charge of the execution of such buildings.

"In Paris and France generally the architect is the sole and supreme master of the work, and his relations with the master-workmen are constant and direct. He makes his contracts, not with one capitalist, but with a dozen master-tradesmen, who each work under his direction and who look to him only for orders to fix materials and assist each other at the several stages of the work.

"This fact renders it essential for an architect in France to be a constant visitor on the works with the superintendence of which he is entrusted; and I have known architects who, if their buildings were in Paris, visited them daily, or, if at a moderate distance from the capital, twice or three times a week. The first time I spoke to Viollet-le-Duc was in 1860, on the works at Notre Dame, which he then visited daily at 5 P.M.; and the last time I spoke to Louis Duc was in 1878, on the works of the Palais de Justice, where he was daily engaged with his assistant architects and draughtsmen.

"The variety of those sciences and the multifarious duties which, according to Philibert de l'Orme, pertain to the architect, have necessarily encouraged the rise of subordinate artists, each with special attainments, and each able to afford him assistance in his practice. It was quite impossible for one man to combine in his own person all the arts and sciences which the ancient architect was supposed to master; an ordinary lifetime is not long enough to acquire them. If one dared to advance a proposition that the architect whom Vitruvius drew was an ideal representative creation—the genius of a trained band of workmen—and not an individual, the practice of the Middle Ages would serve to support it, and that practice was founded directly on Roman precedent. During this century—indeed, ever since the Reformation—no individual has pretended to the possession of practical experience in even half of the arts and sciences which constituted architecture in its ancient sense. British architects, during the two preceding centuries and in the early years of the present one were largely indebted to foreign draughtsmen for the design of some of their best works; and they have invariably been what are now known as general practitioners. They were certainly not accomplished or effective draughtsmen. The abilities in this respect of Sir Christopher Wren, who was Surveyor of His Majesty's Works—the Office of Works of his time, as Mr. Mitford once happily called him—would not command much respect at a Royal Academy Exhibition of the present day. No one, in fact, supposes that Wren executed with his own hand the drawings prepared for the design and execution of the numerous edifices with which his name is identified. Yet, even to the practised eye, all those edifices possess an extraordinary family resemblance, an absolute harmony of conception; and the majority of them are excellent examples of architecture. If one cross to Paris, to examine the Porte Saint-Denis, of which François Blondel, who began the practice of architecture at the age of forty-seven, was the architect; or the dome of the Invalides, by J. H. Mansart, who built the Palace of Versailles and a host of other state works, it is similarly difficult to believe that such men made the drawings for the design of those buildings. It is certain, moreover, that Sir William Chambers was not what is called a draughtsman, though Somerset House, the finest building of the kind in London, is known to be his masterpiece. All such men were surveyors in the modern sense of the term, and liable to be described by Mr. Norman Shaw as 'commission agents.' Hence there is nothing extraordinary in the assertion that there have been persons—surveyors rather than artists or craftsmen—who, being men of judgment, position, and means, have so used their opportunities and so exercised their natural abilities of a scientific rather than an æsthetic nature, as to produce architectural monuments of which their posterity is proud.

"The surveyor-architect who employs, not ghosts, but draughtsmen, to make drawings for the buildings with the design and superintendence of which he is intrusted, is ordinarily a successful practitioner. Why is this so? In plain words, is his success due to the invincible ignorance

of the British public in matters of art, or to their understanding better what they really want than the artists who abuse them? His success is mainly due to the fact that many clients believe they will be better treated by him in matters of construction and sanitation than by the architect who professes to be an artist only; and a few perhaps believe that such important branches of the architect's duties will be more cheaply performed by the surveyor who does them himself than by the artist who employs specialists for the purpose.

"Others, who have more than a superficial knowledge of the business of architecture, prefer to employ an architect who is also a surveyor (in other words, Mr. Norman Shaw's 'commission agent'), because they know that he will personally plan the drainage and general sanitary arrangements of the house they wish to possess; that he will plan the ironwork required in the construction, calculate the scantlings and the weights of the girders and joists; that the specification of the works will be written under his immediate direction, and that he very probably will take out the quantities himself; and lastly, a by no means unimportant item of an architect's duties, that he will be able to decipher the contractor's hieroglyphics after the house is finished and he is called upon to settle the accounts. Further, it may be reasonably assumed that the 'architect and surveyor' will personally survey the works in progress because his tastes lie that way—that is, in the direction of the scientific and practical side of an architect's duties. But then, the design—will the architect and surveyor design as well as the architect and artist? Let those who ask that question inquire of the hundreds of admirable draughtsmen who are perfectly competent to design, and who will lend their artistic abilities even to architects and surveyors at a weekly salary of from two to four guineas. Are these men ghosts? In any case their employment is an open transaction, which will bear the light of inquiry, for they are paid by their master—the architect and surveyor—out of the 5 per cent commission to which he is entitled for works executed from his design and under his superintendence. This may not be a brilliant phase of professional life, though numerous instances may be adduced in which the taste and judgment possessed by many surveyor-architects, who are not artistic draughtsmen, have immensely assisted the æsthetic development of their draughtsman's design."

"The late William Burges, A.R.A., told me that he often designed by the aid of a draughtsman, and that he considered his best designs had been made when sitting beside his draughtsman and telling him how and what to delineate on the paper before them.

"I have frequently, when a very young man, drawn upon paper what my then master, the late John Prichard (of Llandaff) sitting beside me, indicated in words. Both these accomplished architects, from their exceptional talent as artists in the modern sense of the term, enjoyed the confidence and respect of their brethren.

"Not a word should be said against the man who, having studied architecture with the view of becoming an architect, chooses to devote his abilities to any architectural art or trade—the words were once identical. Nor need any complaint be made of the architect-trader who is pecuniarily interested in the materials which he advises his clients to use, or which, as the agent of his clients he specifies in buildings entrusted to his design and superintendence—provided, of course, he tells his clients that he is thus pecuniarily interested."

The opinions of the presidents of the Royal Institute of British Architects from 1860 to 1891 to which Mr. Murray refers were:

Professor Cockerell, R.A., 1860. "The partisans of the scientific and the imaginative have ever been in rivalry. But the evidences of history will prove the necessity of both these faculties in the accomplished architect, and it is to the cultivation of them that the Institute will direct its impartial attention in proportion for the glory of the art and of the country."

Sir William Tite, M.P., 1861–63. "Architecture is an art as well as a science."

Professor Donaldson, 1863–65. "In speaking of the professional career I must venture to urge the importance of young men acquiring the business qualifications of practical life, as being essential to their satisfactorily realising all the fruits of the more intellectual departments of their pursuit."

Alexander J. B. Beresford Hope, M.P., 1865–67. "While architecture is an art, it is also what, for want of a better term, I must call a business or craft. (In a footnote Mr. Hope added: "Profession applies to the person who professes, and not to the thing professed.") It is this perpetual combination of the *utile* and the *dulce*, the perpetual necessity of adapting style, ornament, and proportion to construction, and of so manipulating construction that it shall not sin against beauty or detail or mass, which makes architecture the peculiarly complicated and scientific thing which it is—an art and something more than art."

Sir William Tite, M.P., 1867–70. "Our desire, as members of this Institute, must naturally, and always ought to be, to encourage architectural education. . . ."

Thomas Henry Wyatt, F.S.A., 1870–73. "It would be strange, indeed, if an institution like ours were indifferent to a scheme which practically tested the progress of that knowledge of the various arts and sciences connected with architecture, for the advancement of which this Institute was actually founded."

Sir G. G. Scott, R.A., 1873–76. "Our camps are visited by that great enemy of union and sympathy, self-conceit. I do not refer to that noble self-reliance which gives a man courage for his work, however difficult, but that lower sentiment which too often makes him intolerant of his fellow-labourer, however true-hearted, and which, by means of mutual scorn and depreciation, tends to encourage those whose innocence of art keeps them beyond its range, and warns the careless public against the employment of those who thus bear witness one against another."

Mr. Charles Barry, F.S.A., 1876–79. "We may learn from our detractors . . . how needful it is in these days of extensively diffused scientific knowledge and scientific inquiry to pursue exhaustively our inquiries into these scientific and practically important subjects. Let us welcome, then, the discussion of these matters, and it may be we shall do more thereby to add to the power of the architects of the next generation to carry out large works—beautiful works—and works distinguished by their sanitary excellence, than we ever can by the more exciting discussions whether architecture attained its maximum ex-

cellence in the thirteenth century or in the days of Queen Anne.

"We ought to take up courageously the challenge so frequently made to us, and to discuss among ourselves—with that special knowledge we ought to possess, and which many of our members do possess—technical questions affecting the life and happiness of those whose houses we are called upon to design and arrange. It ought to be impossible to allege with truth, as is so often done, that architects care only for the æsthetical, and delegate to subordinates the vital questions of ventilation, warming, lighting, sanitary arrangements, and cognate matters."

John Whichcord, F.S.A., 1879–81. "I am induced to quote a passage from an address delivered from this chair by the first professional president who ever sat in it. I mean Charles Robert Cockerell. He was a man who was, if anything, an artist. His words, uttered twenty years ago, when the graphic side of architecture was less understood and less followed than it is at present, merit your immediate attention. 'So rare and difficult,' said he, 'is the union of the scientific and graphic departments of this art in the same person that theoretic writers are at variance as to the preference to be given to the one or the other faculty. Thus the learned Rondelet defines architecture as "a science, the object of which is to direct the operations of every sort of building, so as to unite convenience, solidity, and beauty of form." . . . Most modern architects are rather decorators than constructors, aiming, like the painter and sculptor, chiefly to please—indulging in captivating, but often impracticable designs, induced by their associations with the imaginative arts of painting and sculpture.' . . ."

"The late Professor Cockerell makes a pertinent quotation from Rondelet, who, at the very beginning of this century, described the architect of his day as a decorator rather than a constructor. Are we quite convinced in our own minds that Rondelet, if he lived at the present time, would define an architect in language more agreeable to our own sense of what he should be? Are we quite sure that the cry for art, more art, in which I admit this country was long deficient, has actually provided us with what we required?

"Has not the tendency in England of late years been to unduly exalt the art at the expense of the science of architecture? So that architectural science is gradually becoming the specialty of men who are not, and who do not pretend to be, architects."

George Edmund Street, R.A., 1881. "The real interests of the public, and of ourselves are identical. The obligation to carry on the business side of our work upon the highest rules of honour or integrity, as between man and man, is placed in the very front of the conditions of membership of this Institute. We admit of no compromise or conditions; and the condition of membership here is undoubtedly that of working thoroughly in the spirit and traditions of gentlemen. . . ."

Sir Horace Jones, 1882–84. "I hold and think that any examination testing the scientific requirements or the maturer and readier intellectual qualities of the young architect need not militate against his artistic and æsthetic powers, any more than the scientific training, education, and examination of the aspirant for military employment need exhaust his physical qualities, or his moral ones of courage and conduct."

Mr. Ewan Christian, 1884–86. "But no instruction that can be devised will make men architects who have not the inborn genius to become so; it may, however, make them well-instructed practitioners, and everything that can be done towards raising the general standard of knowledge must necessarily be in the highest degree advantageous. . . . That there must nevertheless be exceptional cases is also inevitable, and it is in my judgment not undesirable that so it should be. There will, I trust, always be some exceptionable men, deep students and real artists, to whom the ordinary rules of examination cannot apply; men of genius to whom solitude is the nurse, who may not see with our eyes, but whose presence amongst us would necessarily be welcomed; men who, having proved their power, could not be asked to submit to ordinary rules. There are such men now, and there may be more in the future, and it would be for our welfare to include them all amongst us."

Edward I'Anson, F.G.S., 1886–87. "When I was a young man, my feelings used to induce me to think that the only really important part of architecture was art, and that artistic power was wholly an instinct—that, in fact, the highest quality of an architect was to be an artist. But, depend upon it, art power does not suffice to make an architect. The grandest effects in architecture have depended quite as much upon constructive as upon artistic knowledge. . . . I am, therefore, an advocate for the systematic teaching of art, as far as it can be taught, and of all those sciences pertaining to the theory and practice of building construction.

"The traditional custom of apprenticing young men to a practitioner, whereby they can closely follow and assist in the work done in an architect's office is, I still think, a right system, advantageous to the apprentice if he be worth anything at all; but it is far, very far from being enough, and the more often this is emphasised by those who occupy the position I have the honour for a time to hold, the better it will be for the profession, at least until the subject of architectural education is better understood than it is at present, or until people cease to repeat the formula that architects, like French cooks, must be born, and cannot be made."

Mr. Alfred Waterhouse, R.A., 1888–91. "We have heard something lately of the conflicting terms 'professional man' and 'artist,' as applied to the architect. Now, in my opinion, the true architect is both. The higher and more systematic education, which we are hoping for and getting, will train us in the efficient and easy practice of our profession—a profession which is open to all men of education, intelligence, and industry, and one in which the greatest successes will attend those to whom, further, an artistic perception has been given, and in whom it has been carefully cultivated. In speaking of an architect as an artist, I do not mean that he is to be a clever draughtsman merely—far from it. A man may be the most exquisite of draughtsmen, and yet be entirely deficient in the critical sense of what it is that makes a work of architecture beautiful. . . . The architect, on the other hand, can find nothing to do, can give no satisfactory proof of his capacity, until somebody comes to him who is willing to trust him. Consider what

that trust is. Not only is he entrusted with the expenditure of large sums of money, but of money expended in such a way as to affect the comfort, the happiness, often the whole tone of the existence, of those who employ him. . . . The architect, therefore, has to be not only an artist and a skilled constructor, but he must learn to appreciate the value of other people's money; he must be considerate, honest, patient, firm; and, above all, he must learn in imagination to put himself in the place of his clients, so as to understand their desires."

Mr. John Macvicar Anderson, 1891. "What is the argument on which this opposition to examination is based? You will find it embodied in a memorial which was presented to the Council and in a letter which the memorialists published in the *Times* (March 3, 1891), under the title of 'Architecture: a Profession or an Art?' words which appear to me to suggest under an attractive form an entirely false issue and one which in its essence is misleading. To declare that architecture is an art is to repeat a truism. . . . It is an art and a profession. To ask whether it is an art or a profession is not only, in my judgment, to put the subject in an incomplete and a misleading form, but to endeavor to divorce two things which are indissoluble. Why, the unique characteristic of our calling is that it combines such different qualifications—artistic taste, scientific knowledge, business proficiency! We have no claim to be architects in the true and full sense of the word unless we are artists, able so to dispose and to clothe the materials with which we have to deal as to produce beauty of form and proportion. But we must also be scientists, so familiar with the strength and properties of materials as to combine them in sound construction; and we must, moreover, be men of business, so conversant with affairs as to be able to protect the pecuniary trusts which are committed to us. . . . The body politic of architecture is composed of parts, each one of which is essential to the unity of the whole, and without any one of which it would be incomplete and useless to society."

Mr. Murray then concludes his letter with the following:

"From the foregoing views it appears to be clearly demonstrated that modern architecture is an art which cannot under modern conditions be satisfactorily attained or correctly practised without the combination of a full share of scientific and financial considerations.

"Having due regard to this truism and also to the fact that in the past it has not been universally understood and adopted, I think it is essential for architects to realize now that there is a danger of comparative disaster overtaking private practitioners in the profession which is known as 'architectural,' and this would probably retard the future advancement of architecture in Britain.

"Some adequate remedy is surely necessary, and I therefore venture to inquire:

"(1) Is not the so-called supervisor- (surveyor) architect, whom the public have largely patronised, if he knows his work, designs and produces fine architecture by the aid of science and finance combined with business considerations, worthy of the high appreciation of the architectural world?

"(2) Would not such appreciation when awarded for the best work practically coincide with the system of modern eulogy bestowed upon such old masters as Inigo Jones, Sir Christopher Wren, Sir William Chambers, John Nash, and many other modern supervisor (surveyor) architects, including many distinguished French architects?

"(3) Or, is it to be agreed that an architect who can design good architecture is incapable of acquiring a knowledge of and practising a full share of science and finance in connection with the art of architecture; or, if capable, that these essentials, which are required by the public, are unnecessary or beneath the artistic dignity of architectural art, thus producing conditions which have recently received severe stricture from a distinguished representative of the Government?

"(4) Is not the present time, the eve of the Great Peace, the most opportune moment for some sufficient and guiding policy to be clearly defined, and is it too much to expect that this might be done by the Royal Institute of British Architects in conjunction with the Royal Academy of Arts? These two authorities practically succeeded the mediæval art guilds, and now the developments and responsibilities of a strenuous future lie before them. The former was founded in the year 1834, 'for the general advancement of civil architecture and for promoting and facilitating the acquirement of the knowledge of the various arts and sciences connected therewith;' and the latter was established in the year 1768, 'for promoting the arts of design.'

"I fear, however, that without the universal recognition and practice in future by the architectural profession of a full share of science and finance as essentials in connection with architecture, the patronage of the architect by the public is likely to wane still more in this country in favour of other professions less qualified in architecture, to the lasting detriment of the art of architecture in Britain.

"More sympathetic unity and publicity of the merits of the general body of architects, many of whom excel in art as well as science and finance, would probably enlighten the public and possibly convert the sceptical.

"Perhaps this might be accomplished under the auspices of the Royal Institute of British Architects by holding periodically a great public exhibition of architects' work in all its branches; and it might with advantage be arranged also under the ægis of the Royal Academy of Arts, which was established 'for promoting the arts of design.'

"If this were accomplished, I can perceive a vision of a Press luminary largely patronized by the general public giving illustrations and artistic, scientific, and financial information and criticisms upon the designs, etc., exhibited, and upon numerous interesting and important problems, such as architecture in relation to every kind of art, science, and finance connected with education, the Church, the home, hospitals, music, the drama, the opera, Imperial, county and municipal government, agriculture, railways, trades, manufactures, monuments, and sports.

"By some such means, combined with the aid of the Press, it would be possible for many architects to demonstrate in a legitimate way their ability to do the services required by the public, including art, science, and finance—all of which must, in my opinion, be supplied in future, in a full degree by the architect himself if architecture is to remain a living art in Britain."

Housing Activities About the World

Housing in Canada*

The object of the Government in making provision for a loan of $25,000,000 at 5 per cent to the Provincial Governments for housing purposes is—(*a*) to promote the erection of dwelling houses of modern character to relieve congestion of population in cities and towns; (*b*) to put within the reach of all working men, particularly returned soldiers, the opportunity of acquiring their own homes at actual cost of the building and land acquired at a fair value, thus eliminating the profits of the speculator; (*c*) to contribute to the general health and well-being of the community by encouraging suitable town-planning and housing schemes.

The provision of houses, so far as it may be regarded as a public duty, is a matter which comes more properly within the jurisdiction of the provinces and municipalities, and in ordinary circumstances, the question of what regulations should be imposed, and what policy should be adopted, in regard to the administration of housing schemes, are matters for these governments. As the Federal Government will lend the money on the general security of each province, it is not necessary to impose financial regulations as to the means which should be employed to safeguard the loans.

Conditions on Which Loans Will Be Granted

Approval of general provisions. Each province shall prepare and submit to the Federal Government for approval a general housing scheme, setting out the standards and conditions to be complied with in connection with local housing schemes. The general scheme of each province should include a schedule of minimum standards in regard to grouping of houses, provision of open spaces, sizes and heights of houses, sizes and heights of rooms, provision of light and ventilation, heating, lighting, character of materials, etc., which it is proposed should be enforced as the minimum requirements for health, comfort and convenience.

Maximum cost of dwellings. The object of the Federal Government being to facilitate the erection of dwellings at a moderate cost suitable for workingmen, particularly returned soldiers, it is necessary to place a maximum on the amount which may be loaned per dwelling, and the following maximum has been fixed having regard to the conditions existing in the different provinces:

(*a*) Detached or semi-detached dwellings with walls constructed wholly or partly of frame, stucco on frame, brick veneer, inclusive of the capital value of the site and necessary local improvements: With 4 or 5 rooms, exclusive of bathroom and summer kitchen, $3,000; with 6 or 7 rooms, exclusive of bathroom and summer kitchen, $3,500.

(*b*) Detached, semi-detached, groups of three or more or duplex (cottage flat) dwellings with walls of brick, hollow-tile, stone or concrete and roofing of fireproof materials, inclusive of the capital value of the site and necessary local improvements: With 4 or 5 rooms, exclusive of bathroom and summer kitchen, $4,000; with 6 or 7 rooms, exclusive of bathroom and summer kitchen, $4,500.

Ownership of land. Public money may be advanced for building houses on sites owned by:

(*a*) The Provincial Government or municipality.

(*b*) Housing societies or companies comprising groups of citizens associated to promote good housing, supplied with proper improvements, such societies or companies to have not more than a statutory limitation of dividends payable on stock of 6 per cent.

(*c*) Owners of lots for the purpose of erecting houses for their own occupancy.

Terms of years for repayment of loans. The Federal loan will be repayable by the province over a period of twenty years, provided that in order to encourage the erection of more durable buildings, and to bring the financial terms within reach of a large number of workers, the period of twenty years may be extended to thirty years in respect of any portion of the loan which the Provincial Government may decide to re-lend for thirty years for such purposes as purchasing land or erecting buildings under the above class. Repayments by the provinces on account of Federal loans may be made quarterly, if so desired, or otherwise as may be agreed upon.

General Principles and Standards Recommended

The Government strongly recommends that in framing schemes, consideration be given to the following matters:

Acquisition of sites. The success of the housing movement depends upon the acquirement of suitable land at its fair value, and at a cost which workingmen can afford to pay. It is essential, therefore, that statutory provision shall be made by the provinces for a cheap and speedy method of compulsory taking of the land required for housing purposes. To facilitate proper planning and to secure economy in connection with housing schemes, comparatively large sites should, as a rule, be chosen so as to permit of comprehensive treatment. Such sites should be conveniently accessible to places of employment, means of transportation, water-supply, sewers, and other public utilities.

Planning of sites. Where housing schemes are proposed, the sites, as well as the buildings, should be properly planned so as to secure sanitary conditions, wholesome environment, and the utmost economy. The land should be sold under building restrictions that will insure its use for residential purposes only, and should it thereafter be desired to utilize any of the lots so sold for stores or other business purposes, the increased value for such business sites should be made available for public purposes in connection with such scheme.

Loans for separate or individual houses. In those cases where loans are given to workingmen owning lots, care should be taken to insure that the site proposed to be built upon occupies a healthful and convenient situation, and that suitable provision can be made in such situation for the erection of a sanitary type of dwelling, with adequate provision for open spaces.

*Notes from the Government Statement.

Limit of income of persons to be provided with dwellings. In order to insure that the money shall be loaned to those who most need it, no person in receipt of an income exceeding $3,000 per annum should be eligible as a purchaser or tenant of a house erected with the aid of Government funds in any schemes carried out by provincial governments, municipalities, housing associations, or owners of lots.

Construction of local improvements to precede occupation of dwellings. In cities and towns, local improvements, comprising necessary sewers, pavements, sidewalks, water-mains, and lighting services, should be constructed as far as practicable prior to, or simultaneously with, the building of houses, and no house should be permitted to be occupied until provided with proper means of drainage and sewage disposal and an adequate supply of pure water.

Reservation of sites for playgrounds. In all new housing schemes, provision should be made for reserving at least one-tenth of the total area of land being developed for building purposes, as open space for playgrounds, etc., and also for reserving suitable sites for such institutes, public buildings, and stores as may be required.

Loans to be used for purchasing and developing land and erecting dwellings. Advances should be made for: (*a*) The purchase of suitable land for housing schemes; (*b*) the construction of the necessary local improvements on and in connection with the development of such land as part of a housing scheme; (*c*) the erection of sanitary and economical dwellings.

Proportion of cost of land to dwelling. The proportion of the money lent in respect of the capital value of the bare land (i.e., irrespective of all local improvements or other public services provided to adapt the site for building purposes) should not as a rule exceed one-tenth, and in no case should exceed one-eighth of the above gross cost of the dwelling. In computing the value of the bare land under this clause, the cost of such improvements as have been made should be deducted. For instance, the sum of $3,000 might be lent in the following proportions:

Cost of dwelling	$2,400 00
Cost of land	300 00
Capital cost of local improvements	300 00
	$3,000 00

If the value of the bare land is estimated to exceed one-tenth ($300, in this case), the extra cost should be met by the owner.

Recommendations as to minimum standards in regard to sites: (*a*) *Streets.* All dwellings erected in cities and towns should face on streets so constructed as to provide dry and convenient means of access to such dwellings, or on approved courts opening on to such streets, and in no case on lanes or alleys. (*b*) *Sanitary provisions.* In cities and large towns, sewers and water-mains should be provided to enable connections to be made as buildings are erected; and in small towns, villages, and rural areas where no sewers exist, there should be proper sanitary provision for sewage disposal to the satisfaction of the board of health or sanitary engineer of the province. (*c*) *Water-supply.* All dwellings should have connected to them an adequate supply of pure water before occupation is permitted for purposes of habitation. (*d*) *Drainage of sites.* No building should be erected on a site which shall not have been drained of surface water, or which shall have been filled up with any material impregnated with fecal matter, or with animal or vegetable matter, unless and until such matter shall have been removed, and the ground surface under such building shall be properly asphalted or covered with concrete or other dry and hard material to a thickness of 6 inches at least.

Recommendations as to minimum standards in houses—space around dwellings. Provision should be made for securing ample garden- and air-space surrounding the dwellings to be erected. In cities and towns, each dwelling should occupy a lot comprising at least 1,800 square feet, and in villages and rural areas, at least 4,500 square feet. Not less than 50 feet of clear open space in depth should be provided at the rear of dwellings, and the buildings should not occupy more than 50 per cent of the lot. Spaces between the gable or end walls of adjacent buildings should be provided as follows:

Between all buildings (single or in pairs), the walls of which are built entirely of wood or partly of wood and partly covered with stucco or brick veneer, or between all buildings which are more than two rooms deep and have side windows—16 feet.

Between buildings, the walls of which are built of brick, brick veneer, stucco, hollow tile, stone or concrete, with fireproof roofing material, which do not exceed two rooms deep—9 feet.

Dwellings erected of stucco or frame or brick veneer must be either detached or semi-detached (*See* Clause 2, *Maximum cost of dwellings, etc.*). In all cases, hollow walls should be provided.

Sanitary conditions and ventilation. Baths and water-closets should be provided in each dwelling, preferably on the bedroom floor. Baths and sinks should have hot and cold water. Water-closets should never open from a room and should have a window opening to the outer air. Basements should not be used for habitation. Every habitable room should have at least one window opening to the outer air. Each room should have a window-space of at least one-tenth the floor-area, and cross ventilation should be provided where practicable.

Height and sizes of rooms. Rooms should not be less than 8 feet in height on the first floor and 8 feet over two-thirds of the floor area in bedrooms. One living-room should not be less than 144 square feet, and two of the bedrooms not less than 130 and 100 square feet respectively.

Height and type of buildings and character of construction. Buildings should not exceed two and one-half stories in height, except in the case of cottage flats, which might be permitted to be three stories if constructed of fireproof materials. Houses should have four, five, or six rooms, and, in exceptional cases, for large families, seven rooms, excluding bathroom.

Conversion of dwellings into stores. Provision should be made to prevent dwellings being converted into stores or used for any purpose other than a dwelling, except with the authority of the Provincial Government or other suitable authority, and only then on receipt of a petition of two-thirds of the owners and occupiers in the street in which the dwelling is situated. Brick, hollow-tile, stone,

or concrete should be used as far as practicable, preference being given to those materials that are produced locally.

Legal and other costs. A special scale of legal costs should be fixed so as to reduce the expense of the transfer of land and houses. It would reduce architectural expenses if the Provincial Governments issued a series of model designs of suitable dwellings, with detailed drawings, bills of quantities, and estimates.

Compliance with general scheme, etc. All buildings should be erected in accordance with a general provincial scheme, and in compliance with the requirements of standard forms of specification and contract, which shall have been previously approved by the Provincial Government.

Conclusion

The compulsory requirements in this memorandum have been kept down to the minimum of what is necessary to secure compliance with the Order in Council under which the Federal Loan is granted.

Housing Conditions in Paris

From the very complete publication issued by L'Office des Habitations à Bon Marché du Department de la Seine, one learns that Paris, commonly pointed to as an example of wise planning and great civic pride and forethought, has found itself confronted with a housing problem quite as acute as that which has befallen other cities in other lands.

"While in other countries," says the report, "the public authorities have sought to direct the growth of their communities by considerable acquisitions of land [in Germany and Australia and New Zealand, we assume, since the practice has not otherwise been utilized] retaining the benefit of the land increments for those who create them, the city of Paris and the Department of the Seine have, on the contrary, and on each occasion, alienated such parcels of land as might have become their possession.

"If it is impossible, at this time, to suppress the fatal consequences of this lack of forethought, at least we can now discontinue the practice and endeavor to save what land can still be saved from speculation in the Department of the Seine. Any delay may result in the gravest consequences. The parcels of land, of any size, and still free, are diminishing day by day. Since the war, the unheard of industrial development on the periphery of Paris has absorbed much land that had previously escaped speculation."

The Office of Low Cost Dwellings, after further elaborating the exigency of the housing situation and the necessity for immediate action looking toward the acquisition of land, asked for an appropriation of 10,000,000 francs, and this has now been almost entirely utilized in purchasing certain parcels of land whereon are to be developed types of garden cities. There are six parcels of land, varying in size from 40 to 160 acres, and totaling an area of about 500 acres. The preparation of the projects has been committed to duly appointed architect-directors, and the report in question contains plans showing the preliminary studies. These are largely based upon English town-planning practice, and their development must prove of great interest, for the report lays stress on the fact that these communities must not be predicated upon an architectural conception, but upon the necessity for actually serving those who are to inhabit them, and of expressing their life. It will also be of interest in illustrating what actual economic results can be achieved by this effort to introduce small planned areas into the midst of an already overgrown and congested suburban district. Fortunately, the report indicates that the officials are thoroughly alive to the necessity of broader planning, in connection with the outgrowth of Paris, and that the Parisian slum, the haunt of tuberculosis and alcoholism, the grave of so much humankind, must be suppressed in the interest of the nation.

Housing in Australia

The War Service Homes Act

Under the War Service Homes Act, the Minister for Repatriation has announced his intention of advancing from £25,000,000 to £50,000,000 for housing of returned soldiers and their dependents. A Housing Commissioner—a financial expert—has been appointed at a salary of £1,500 per year.

The Commissioner is vested with wide powers including:

(*a*) Compulsory acquisition of land and dwellings in accordance with the simplified and salutary provisions of existing Commonwealth legislation (No. 31 of 1917), and

(*b*) Sale of houses and land on rent-purchase system and advances on mortgage for the purchase thereof subject to vigorous conditions aimed at preventing fraud, speculation, etc.

The Act sets forth in detail provisions relating to the system of advances, which are limited to £700 in the case of every house and not exceeding 90 per cent of the total value of the property. The advance may cover municipal rates or taxes during the period of repayment. Interest is not to exceed 5 per cent per annum.

Present Conditions Worse Than Before War

As with other modern countries, the housing problem in Australia has become worse since the war, although it was more conspicuous before 1914 than public opinion would then admit. Aldermanic self-complacency and the counsel of perfection in most things touching the Australian city have made it difficult for those diagnosing manifest evils of slumdom to escape the popular charge of "slandering the city." But that phase has passed. The influenza epidemic has arrived, and although it appears now to be held in check fairly well, it is turning public attention more to the reprehensible conditions which exist in some of our "garden cities." The problems created by the war are very marked. Recent statistics make clear the shortage of new dwellings that exists in capitals. Evidence and disclosures touching overcrowding and defective housing conditions, are not lacking. There are "slums" in Sydney, Melbourne, or even Adelaide, quite as old as some of the slums of London, Manchester, New York, or Chicago.

Australia's Broad Principles

The War Service Homes Act is largely an adoption and extension of the existing system of state advances to individual owners wishing to acquire and build their own house.

This system prevails in all the Australian states (except one) and New Zealand, and has been in operation for some years. Its effect has been to stimulate house-building and ownership by well-paid artisans and others. (In Western Australia, for instance, members of Parliament come within the scope of the local Act for such purpose.) It has also given much encouragement to estate developers and speculative builders seeking to dispose of their respective properties to buyers financed by the state banks. Without the application of town-planning and garden-city economics and methods, urban development and extensions thus stimulated are neither wholesome, scientific, nor economic. But governments, state banks, and those engaged in estate development have still to be persuaded that there is more satisfactory business to be gained under town-planning than otherwise. The case, however, is so logical and clear that it has to be presented but often enough in the right light to convince reasonable persons of the commercial soundness and economic value of the contention.

The Need for a Development Plan

Whatever results may flow from the War Service Homes Act, other complementary acts are required, both from the Commonwealth and state governments, before the serious arrears in other urban housing can be overtaken. The rehousing of the soldier can only hope to succeed where the demands created by general urban shortage are simultaneously met by the provision of the fresh accommodation required to repair the deficiency. For it is abundantly plain in Australia, after careful statistical analysis, that overcrowding, high rents, and shortage had increased and intensified whilst her soldiers were away fighting overseas. Therefore, town-planners in Australia are increasingly insistent in their demand—

1. That urban housing schemes for the community as well as the soldier are necessary,

2. That such schemes should provide for both soldiers and civilians, and

3. That all housing schemes should form part of and operate with national town-planning and rural development legislation.

These subjects, no doubt, will be ventilated further at the Third National Conference on town-planning and housing which is to take place in Sydney about April or May, 1920. In the meantime, however, the South Australian government has announced its intention to introduce this year a Town-Planning and Rural Development Bill (details of which have not yet been disclosed). The New South Wales government has appointed a State Town-Planning Board, and the New Zealand government has called together its first national Town-Planning Conference and Exhibition. These and other events indicate the rise of the new civic spirit and outlook in the progressive and isolated democracies of the British Empire, where town-planning and repatriation may be regarded as hopeful in the promise of further achievement. CHARLES C. READE.

Housing in England

The Housing Bill has not yet been enacted into law, but the authorities are proceeding with the details of organisation on the basis that the general principles have been sufficiently fixed to warrant such action.

In the statement issued on April 7 last, it is stated that 658 housing schemes had been submitted by 358 Local Authorities, ranging from the thousand acres of housing development proposed by the city of Birmingham, to the fragments of an acre proposed in some of the rural communities. Most of the schemes are in the first stage, the site alone having been approved; of such approvals there were 228. For layouts, 168 had been submitted and 54 approved; 140 submissions of house plans had been received and 49 approved, totalling 2,133 houses.

Public Utility Societies

On April 28 the Government outlined a proposed method for extending the granting of aid from the treasury, originally confined to Local Authorities, to Public Utility Societies. These are characterized as associations desiring to build houses and willing to limit their dividends to 6 per cent. Elaborate provisions for the formation and administration of such societies are set forth in the statement which concerns the management, occupancy, and tenure of the properties; profits earned above fixed charges are to be expended for the benefits of the tenants.

The Government Manual

The Local Government Board has also issued a comprehensive manual of instructions. In addition to containing the printed forms to be used, it also gives numerous suggestions as to the planning of sites, streets, houses, and deals as well with the general regulations governing these factors. The manual states that "Competent architects should be employed to plan and design the houses to be erected."

Acquisition of Land

The Acquisition of Land Bill has not yet passed Parliament, and upon the character and general provisions of the bill everything depends. The need for houses has sent the price of land very high, and unless the bill provides for the compulsory taking of land at a fair valuation, many housing schemes will not only come to grief, but others will be saddled with an excessive cost on the local rate-payers and the national treasury.

Estimated Expenditure

On April 28 the Government stated that "The capital expenditure (in housing) will depend upon the number of houses to be built, the date at which they are built, and the type of house and accommodations provided. . . . The capital expenditure on, say, 500,000 houses, over a three-year period, may be estimated at from £250,000,000 to £350,000,000, the estimated range in cost of house being £500 to £700."

Years	Capital Cost of £500 per House	Capital Cost of £600 per House	Capital Cost of £700 per House
1919–20 . . .	£50,000,000	£60,000,000	£70,000,000
1920–21 . . .	100,000,000	120,000,000	140,000,000
1921–22 . . .	100,000,000	120,000,000	140,000,000
	£250,000,000	£300,000,000	£350,000,000

News Notes

Contractor's Fee for Bidding

At the meeting of the Philadelphia Chapter, May 12, President Sinkler mentioned the scheme that is being considered by the contractors, whereby a charge or fee is to be made by each contractor who bids on a piece of work. There was brief discussion, and any definite action on this proposition was left to the Executive Committee. It was suggested that the adoption of the quantity survey might offer a remedy for the unremunerated expense of estimating to which unsuccessful bidders are now put.

Union Labor in Philadelphia

President Sinkler also mentioned the agreement recently made between a council of the Employers' Association and a council of labor organizations, to the effect that none but union labor shall be employed in building, this agreement becoming effective on June 1. The agreement also provides for a joint council of ten, to adjust disputes that may arise and to eliminate strikes, as far as possible, in the building industries. After some discussion a motion was adopted that the Executive Committee obtain as full information as possible of the exact nature and scope of this agreement and transmit such information in a circular communication to all the members of the Chapter; also that if the Executive Committee shall see fit to do so, it shall call a meeting of the Chapter to discuss this matter.

National Department of Public Works

At a conference of engineering and related organizations held in Chicago on April 23 to 25 last, the Institute being represented by Messrs. Irving K. Pond and Walter D. Blair, the following resolutions were unanimously adopted:

1. That the services and bureaus of the National Government having to do chiefly with matters of engineering and architecture, be grouped in one department to be known as the Department of Public Works.

2. That the Department of Public Works comprise those works which are built and operated for the use of the public.

3. That the Department of Public Works be made available when desirable for the performance of special engineering and architectural work for the use of other Government bureaus.

These resolutions embody principles to which the American Institute of Architects has long been committed, but their intelligent application is of course dependent upon the ultimate adoption of a budget system by Congress, as the Journal has long contended. While the present system of appropriating money for public buildings continues to be based upon the political preferment of congressmen, there can be no hope for a sound and economical public building program for the United States. But a budget system is slowly coming to life. Payment of the cost of the war cannot be left to the old slipshod methods of spending first and raising the revenue afterward.

Registration in Pennsylvania

Speaking of the recent convention of the Pennsylvania State Association, at the Philadelphia Chapter meeting on May 12, Mr. Plack said that two years ago the Association was charged with the work of preparing a bill for the Registration of Architects in the state. The bill failed, because of the provision that no one except an architect could make drawings for the erection of a building. This year the bill has been changed to meet this objection, and will probably pass; the Builders' Exchange, which was in opposition two years ago, now endorses the bill.

The Association of State Boards of Architectural Registration

At the time of the recent Institute Convention held in Nashville, a number of representatives of state registration boards met at lunch to discuss their problems. New York, Illinois, Michigan, Colorado, California, and other states actually having architects' registration laws, were represented, as were also Pennsylvania, Indiana, Ohio, and other states in which such laws are either under consideration or desired. A smaller gathering of a similar character was held at the Minneapolis Convention two years ago, the purpose being to make it possible for the various Board members to profit by the experience of others engaged in the same work and with a view to standardizing, as far as possible, the examinations, and thus to bring about an exchange of credits between the various states, in order that men qualifying in one state may readily be admitted to practice in others without the necessity of re-examination. As a result of the Nashville meeting, a tentative organization was formed, with Prof. Emil Lorch, of the Michigan State Board, as chairman, and Emory Stanford Hall, President of the Illinois State Board, as secretary.

It is hoped that all interested in furthering the work of such an organization will communicate with the secretary, Emory Stanford Hall, 332 South La Salle Street, Chicago.

Housing, Registration, and City Planning in Oregon

The Oregon Chapter has been instrumental in securing the passage of a housing code which is largely based on the Minneapolis Code. The code penalizes the 25- and 30-foot lots which have too often been adopted in the cheap additions—encouraging builders to use two instead of one. The code regulates the proportion of lot covered and provides proper ventilation for all living quarters—hotels, apartments, flats, and private houses.

The Oregon Chapter, after repeated efforts, has succeeded in passing a registration law which is largely based on standard registration laws used by many of the other states. The Board of Examiners will shortly be announced

by the Governor. The bill was endorsed by the engineers, who were also successful in passing a registration law.

The Oregon legislature passed three important bills pertaining to city planning at the behest of the City Plan Commission of Portland, whose consultant, Charles H. Cheney, drew up the bills. These bills authorize the creation of city plan commissions in Oregon cities, enabling acts for zoning, and set-back laws.

The new City Plan Commission of Portland has employed Charles H. Cheney, of California, as consultant, and is at present at work on the zoning of the city.

The Acoustical Laboratory at Geneva, Ill.

The Journal is informed that, in spite of the death of Prof. Wallace C. Sabine, well known to architects as an authority on acoustics, the acoustical work at the laboratory planned by Professor Sabine at Geneva, Ill., will be carried on just as far as possible as he had planned it. The laboratory was designed by him especially for the study of specific acoustical problems such as he had been unable, through lack of time and adequate facilities, to investigate. Suggestions and inquiries from architects in regard to acoustical problems will be cordially welcomed by the Riverbank Laboratories.

Award of Institute Student Medal

Two awards of the Institute Student Medal have been made and are as follows:

To Richard John Carlson, Department of Architecture, University of Illinois; and to Edgar Buenger, Department of Architecture, University of Minnesota.

Building Laws in England and Wales

The Minutes of Evidence of the Departmental Committee on Building Byelaws appointed by the President of the Local Government Board to consider the control at present exercised in England and Wales over the erection of buildings and the construction of streets by means of byelaws and local regulations, and their effect upon building and development is published in a report of 335 large pages of fine print.

The object of the Committee was to find out whether the existing regulations were an impediment to building operations, particularly of small houses. Of the Committee, Mr. Raymond Unwin's name is the most familiar to American architects. Their hearings lasted from May, 1914, until March, 1918, and owners, real-estate agents, enforcing officials, architects, engineers, town-planners, builders, and representatives of housing and development associations testified.

The building byelaws are enforced by local district authorities with a "surveyor" as their executive. The regulations are based in some districts upon Acts of Parliament, in others upon early Public Health Laws, and in still other later cases upon model byelaws issued by the Local Government Board, which has a general control over the whole matter, acting through housing, legal, medical, and architectural departments. The model byelaws issued by the Board are divided into urban, intermediate, and rural models. The local authorities are allowed to divide their districts into the different classes and to pass byelaws based upon these models but departing from them to fit local conditions if the Local Government Board approves. The byelaws control street widths, street construction and sewers, as well as such building matters as air-space around dwellings, foundations, walls, chimneys, roofs, plumbing, drainage, etc., the rural model, however, containing little but health provisions. The typical British precaution of a dampcourse in every wall above the foundation is always insisted upon, and makes us wonder how we get along without it in the United States.

The testimony showed dissatisfaction with some of the older byelaws, framed before the issuance of the Board's models, some of them dating from before 1880, and still enforced without discretion or appeal by the Local Authorities. Some of the objections seem odd to anyone familiar with housing laws in the United States, as, for instance, the plea that rooms should be allowed less than 8 feet high, and that windows should be allowed less than one-tenth of the floor-area of the room, one witness claiming that such a window was unnecessarily large and made a room "extremely uncomfortable and uninhabitable." Some windows have been built with tops only 3 feet above the floor, with no higher window in the same room. Apparently the Local Authorities can reject plans at their convenience as to time and without explaining their objections. The method of appeal from their decision appears to be to go ahead with the work against the ruling, wait for the Authority to commence to tear down, and then to go to court to restrain him from tearing down. The effect of oppressive requirements as to widths, construction, and sewerage in streets, in driving the developer to build his houses on narrow lots, was dwelt upon. A stone-paved street 40 feet wide, with flagged and curbed sidewalks and with separate sewers for rain and foul waters, naturally leans to houses only 13 feet wide. A "garden city street" was defined as a street with grass verges, and the impracticability of maintaining the grass in some localities was pointed out. A "garden street" is a footpath in front of the houses, with a paved service-street about 10 feet wide back of the lots, and was advocated as economizing on paving and maintenance costs. It was noted that when local authorities entered upon housing undertakings of their own, they usually revised their own byelaws by making them less severe.

Among the interesting opinions expressed were that all byelaws dating from the last century be revised by compulsion against the Local Authorities who still insisted upon them; that the model byelaws should be universal in their application as far as possible, at any rate in regard to fundamentals; that they should not be too specific; and that there should be appeal to some expeditious and inexpensive tribunal before going to the courts. The possibility of a local part-time representative of the Local Government Board serving as a member of such an appeal board was suggested. Such local representatives of a central body, to serve only when needed, might be useful in this country in some places where local work was infrequent and the local inspecting authority incompetent. The difficulty of changing building regulations based upon an Act of Parliament, as compared with regulations issued by the Local

Government Board or by the Local Authorities, was made clear.

The report exhibits the British paternal attitude toward the "working classes," the realization that every opportunity must be given for the development of new methods and relaxation of the older existing regulations if the "working classes" are to be economically housed, and the unwillingness to change from the customs and regulations to which the Local Authorities have become accustomed.

CHARLES W. KILLAM,
School of Architecture, Harvard University.

"La Fin des Fortifs"

The Paris fortifications are to be levelled. The war has demonstrated their utter uselessness as a defence. They are less than a century old, to be sure, for they date from the Paris of Louis Philippe and of M. Thiers, says *L'Illustration*. It seems a pity that their futility could not have been discovered earlier, for thus their malign influence upon the development of Paris could have been in some measure averted.

On the site of the demolished walls, it is proposed to lay out squares and gardens, and to build houses for workmen.

Architectural Instruction for American Soldiers in France

The *Christian Science Monitor* prints an account of the work of Mr. Ernest Coxhead, a member of the Institute, in organizing and conducting classes in architecture in France, from which we quote:

"Among the Americans who enlisted for construction work in France was Ernest Coxhead, a practising architect of San Francisco. Before he reached France the armistice had been signed, so he was transferred to the educational commission and sent to Le Mans to conduct classes in architecture. Of the 200,000 young men in the Le Mans area, quite a number were students of architecture, whose studies had been suddenly broken off and their civil career brought to a standstill. These young men found themselves in a land of wonderful buildings. Close at hand were cathedrals, chateaux, public halls, whose beauty and grandeur could be appreciated but not assimilated for lack of time and proper instructive guidance.

"When Mr. Coxhead's plans were laid before the general commanding in the Le Mans area, his enthusiastic consent was immediately obtained and a class was started. It contained 22 "boys" who had had some architectural training, who were detailed for a three-weeks' course of intensive study. They reported to Mr. Coxhead for work at 8 A.M. and continued, with intervals for mess, until 9 at night. During the third and last week of the course a five-days' tour was arranged to Orleans, Tours, and the great chateaux and churches of Chartres, Blois, Chambord, and others.

"The course ended with a highly successful exhibition of the work done, held in the hall of the Municipal School of Design at Le Mans. Here more than 200 drawings were displayed, varying from rough sketches to water colors and oils, attesting to the value of the work done. Mr. Coxhead is seeking to establish a number of centers for architectural teaching, each under a competent instructor, which shall move in rotation from point to point, the entire course covering a period of three months. Of course, only architects, or men who have had some practical training under an architect, would be eligible."

Registration in Minnesota

The registration bill advocated by the Minnesota Chapter and presented at the last session of the legislature of that state passed the House, but on account of the large number of bills before the Senate, the bill was not acted upon and will therefore have to hold over for two years.

The New New York State Association of Architects

At an enthusiastic meeting of architects held in Utica, N. Y., on June 7, 1919, a new society was formed, called The New York State Association of Architects. The organization is independent of any existing architectural organization. The old Association of the same name, which was formed some six or eight years ago by the four Chapters in the state, was on this same day adjourned *sine die*, and is now no longer in existence.

Early in May a call was sent out to all the registered architects in the state of New York, inviting them to express their opinion with regard to the need for a new Association, which would be composed of all the architects in the state irrespective of anything except their qualifications to practise under the registration act. The reply was instantaneous. Within three weeks, namely, at the time of the Utica meeting, more than 400 architects of the State had written to say that they were interested in the plan and wished to know more about it. At the Utica meeting there was every evidence of enthusiasm. The general discussion showed clearly that there was every desire on the part of the participants to form part of a group which would not only be helpful in advancing the interests and the qualifications of the architectural profession, but also increase the public service that the profession could render. What was most interesting was the democratic spirit that pervaded the meeting. The Constitution and By-Laws, drawn up on the spur of the moment, were passed on within a few hours because of their absolute simplicity. The most distinctive clauses are those on membership. The first reads:

"All architects registered in the state of New York, and all architects whose standing in practice is approved by the Board of Directors are eligible to membership in this Association."

This sounds very simple, but it really means a good deal. If the intention of the Utica meeting is carried out, it means that there are to be absolutely no other tests for admission to the new organization than those here described. The professional standing is to count in no way whatever. Having reached this interesting point, the meeting then went on to adopt Mr. Ackerman's admirable suggestion that the new organization include architectural draftsmen as junior members, similarly elected without

any qualifying conditions other than the fact of their being employed by architects eligible for full membership. This clause was adopted subject to revision by a committee somewhat as follows:

"Junior Members: All architectural draftsmen, working in the offices of architects, members or eligible to membership in this Association, are eligible to junior membership."

There was no dissenting voice from the resolutions adopted, in which the intent was clearly expressed to join in one organization (which is really in the nature of an architectural guild) everyone engaged in the practice of architecture within the state of New York, either as an employer or as an employee, irrespective of age, race, color, or servitude!

The officers elected to hold office until the first annual meeting, which is to be held in February, 1920, are as follows:

President, Ornan H. Waltz, Ithaca; First Vice-President, Robert D. Kohn, New York City; Second Vice-President, Edward B. Green, Buffalo; Third Vice-President, Frank H. Quinby, New York City; Secretary, Walter B. Frank, Utica; Treasurer, Harry W. Green, Watertown. Directors: J. Riley Gordon, New York City; F. L. Ackerman, New York City; Gordon Wright, Syracuse; M. M. Feustmann, Saranac Lake; and William P. Banister, Brooklyn.

Two committees, one on Membership and one on Public Information, were appointed, and the prediction was freely offered that the Association would have a thousand members within a year. The dues of the members are $5 a year, and of Junior members $3 a year.

There were architects at this meeting representing all the various architectural societies of the state of New York, Institute and non-Institute, and architects who were connected with no society at all. In a few weeks copies of the Constitution and By-Laws and propaganda literature with regard to the Association will be printed and will be ready for distribution. Architects in the state who are interested and who have not yet joined should certainly send in their names to the secretary. All those who join within the year 1919 will be considered as charter members. Those in other states who are interested in this type of organization, and who would care to see whether or not similar movements could be started in their own states, should also write for information to the secretary, Walter B. Frank, Utica, New York.

Not the least interesting indication of the spirit of the new organization is evidenced by the fact that its first regular meeting in the fall is to be held in Albany, and by vote of the organization the meeting is to be devoted to the subject of housing conditions in every county of the state.

ROBERT D. KOHN

Franco-American Committee

The French Technical Mission, composed of architects, engineers, contractors, and manufacturers of building specialties, to which reference was made at the Nashville Convention, has arrived in New York. The Commission is headed by M. Jacques Greber, who is already well known in this country through his work for the Philadelphia City Planning Commission, and the other architect member is Paul Cret, F. A. I. A., who, as the members of the Institute are aware, has recently returned to Philadelphia after four years' service in the French Army, during the last year of which he was attached as Liaison Officer to the American Expeditionary Forces.

MM. Nugue and Perreaud represent the engineering profession, the former being a manufacturer of brick- and cement-making machines and elevators, carriers, crushers, etc., and the latter being a specialist in machine tools and mechanical engineering. M. Jacob is a manufacturer of plumbing fixtures and is also interested in tiles and pottery, and M. Bonhommé is a contractor for masonry and large public works.

The Commission expects to spend about a month in this country, traveling as far west as Chicago, and plans to study various housing developments in which, naturally, all its members are interested, and to examine into American methods of building, American materials, and the labor-saving machinery used in construction work; also to study the design of machinery used in the production of building materials.

In view of the restrictions on importation in France, the Commission will make an especially careful investigation to determine in what cases this prohibition should be lifted and in what cases it will be possible to apply American methods of production to materials which can be procured in France.

The possibilities of standardization in certain elements of construction, which were well exemplified in the Emergency Fleet and Housing Corporation work, are also of interest to the Commission, while the possibility of the establishment of a Franco-American clearing-house for information of interest to architects and builders in both countries is under discussion with the members of the Committee appointed by the Institute.

It is hoped, also, that, through the conferences between the French Committee and the Committee of the Institute, there may develop an interchange of ideas on professional matters which will be of real value, both to American and French architects.

The members of the Institute Committee are: Robert D. Kohn, William Emerson, J. L. Mauran, E. W. Donn, Irving K. Pond, and Charles Butler, Chairman.

The Ideal House

Under the above caption, and as a part of the serious discussion on the housing shortage and its attendant crisis in England, now filling the columns of the English press generally, there recently appeared the following interesting comment and opinion in the Daily News (London). If the writer seems to indulge the popular opinion that architects and builders "should send along plans" he at least awards a rare meed of praise to one who has pleased him.

"I have at times lived in half a dozen different houses, and boarded at many more, including the old home down west, the feature of which was the ample kitchen with its stone floor—ample enough to swallow a table to seat twelve, a sofa, two easy chairs, and a grandfather's clock, to say nothing of fowling pieces and warming pans on the walls.

"My ideal small house would be a compound of the

best I have seen. Finishing with a fair-sized, stone-floored, glazed-tiled scullery, with sink, copper, and washing-bench where odd jobs, such as carpentry, could be done on winter nights, it would include a sizable kitchen containing an ample up-to-date cooking range heating a constant hot water service to the sink and copper downstairs, bath and lavatory basin upstairs, and warming always a hot linen cupboard. There would be a tolerable parlour with casement windows downstairs, and two good bedrooms, a third small one and a bathroom upstairs. This can be, and is, done on a frontage of eighteen feet with no 'back additions;' but it is skimpy. Properly it requires twenty-one feet. Kitchen-sculleries, I find, are a mistake; they are usually small, and the environment of the copper is not exhilarating.

"I would eliminate 'winders' in the stairs, drops or steps in the passages, and specify all doors to open without beating against another open one.

"I would suggest inviting architects and builders to send along plans of what has been done.

"Within a quarter of a mile from here (six miles from St. Paul's), there are two short terraces of new villas all let at about fourteen shillings weekly. Of exquisite elevation, they are things of beauty. That architect should be raised to the peerage and given a big job right away."

War Memorials

The Chairman of the Subcommittee on War Memorials (Post-War Committee), Mr. Horace Wells Sellers, reports that the Southern Pennsylvania Chapter has appointed a committee on War Memorials, including several influential citizens, and has, at the suggestion of the Chairman, forwarded to the Governor resolutions urging the passage of the bill providing for a State Art Jury. The Pittsburgh Chapter has also urged the passage of the bill, and is now taking steps toward the formation of a local committee. Other Chapters are similarly at work in coöperation with the Subcommittee; the address of the Chairman is Stephen Girard Building, Philadelphia.

Institute Business

Meetings of the Board of Directors

Meetings of the Board were held at Nashville on the two days prior to the Convention, but most of the business there transacted was in connection with the Convention Actions published in the last number. The following items remain:

Unanimous Endorsement. Attention was called to a standing order of the Board of Directors which provides that no applicant can be given unanimous endorsement by a Chapter unless he was a member of the Chapter prior to December 6, 1916. This prevents those who have been elected Associates since then from receiving unanimous endorsement. It discourages an increase of membership and draws an unnecessary distinction.

Resolved, That the standing order be amended to permit Associates to receive unanimous endorsement regardless of the time of election.

Revision of Disciplinary Rules. Mr. Sellers presented a draft of revised rules for the guidance of the Committee on Practice and the Judiciary Committee of the Board of Directors, prepared jointly by himself as Chairman of the Judiciary Committee, and Mr. Elmer C. Jensen as Chairman of the Committee on Practice. The document embodied the changes in disciplinary procedure arising from the amendments to the By-laws as passed at the Fifty-first Convention, and other changes by the Committee.

Resolved, That the document be approved, subject to the approval of Institute counsel, and issued as an Institute document.

Journal Policy. The President presented letters from Messrs. Cass Gilbert, R. C. Sturgis, and C. Howard Walker criticizing an editorial which appeared in the March number of the Journal under the title "Shadows and Straws." The letters were read in full.

Resolved, That the latter portion of Mr. Walker's letter with reference to the work of the architect and the engineer be referred to the Post-War Committee.

The President stated that he wished to go on record as leaving the Editor with no greater share of responsibility for the editorial in question than should be borne by the Committee on Publications itself.

After several expressions of opinion regarding the editorial policy that should be followed, it was

Resolved, That the following be transmitted to the Convention in the Board's report as a statement of the position of the Board:

"The March number of the Journal contained an editorial which has aroused strong controversy on other than architectural grounds.

"While the responsibility for the editorial is shared by the President, the Committee on Institute Publications, and the Editor of the Journal, the Board should assume its share of responsibility as it has not laid down a definite editorial policy heretofore.

"Regardless of whether or not the article in question expresses the opinion of the Institute, and without consideration of the merits or demerits of the arguments used in the article in question, the Board believes that such an article was not of the type which should be published as an editorial in the Journal. Therefore, the Board instructs the Committee on Publications that the columns of the Journal should not be devoted to matters which may become the subject of political or religious controversy."

The meeting of the Board on May 3, the day following the Convention, was almost entirely occupied with the appointment of committees for the year 1919–20, the following of which are now complete:

Executive Committee. Thomas R. Kimball, William Stanley Parker, D. Everett Waid, Richard E. Schmidt, and Robert D. Kohn.

Judiciary Committee. William B. Faville, Chairman, Richard E. Schmidt, Henry H. Kendall.

Instructions: The instructions to the Judiciary Committee are contained in the By-laws, and in the document known as "Rules for the Guidance of the Committee on Practice and the Judiciary Committee," as revised by the disciplinary committees during 1918–19 and approved by the Board of Directors at the meeting in Nashville, subject to the approval of counsel.

Committee on Practice. Elmer C. Jensen, Chairman. (One member in each Chapter.)

Committee on Allied Arts. Wm. B. Faville, Chairman; Charles Z. Klauder, E. H. Hewitt, Frank B. Meade.

Instructions: This Committee is charged with the task of encouraging and stimulating all forms of art, both for their inherent value as social forces and as necessary channels through which collaboration may lead to a better architecture, to an ever-widening appreciation of the value of good building and a knowledge of the benefits to be derived from the wise physical development of all our communities, both small and great. It should coöperate with the Committee on Publications in making available for regular publication in the Journal such articles and illustrations as it deems to be meritorious contributions to any art. The Committee is also charged with the duty of nominating candidates for the Institute medals in Allied Arts and Fine Arts, the latter according to vote of the Fifty-second Convention.

Committee on Contracts. William Stanley Parker, Chairman; M. B. Medary, Jr., Vice-Chairman; F. E. Davidson, Edwin H. Fetterolf, Goldwin Goldsmith, Sullivan W. Jones, Richard E. Schmidt.

Committee on Preservation of Historic Monuments and Scenic Beauties. Horace Wells Sellers, Chairman; W. R. Briggs, Arthur Benton, Arthur Brown, Glenn Brown, George Cary, C. A. Coolidge, Reinhardt Dempwolf, W. M. Ellicott, Norman M. Isham, Elmer C. Jensen, Fiske Kimball, L. A. Livaudais, L. W. Robinson, Howard Sill, Egerton Swartwout, Ornan H. Waltz, N. G. Walker.

Committee on Institute Publications. For three years: Milton B. Medary, Jr., Ben J. Lubschez; for two years: C. L. Borie, Jr., Herbert B. Briggs; for one year: Frank C. Baldwin, William Stanley Parker.

Subcommittee on Public Information. Not yet complete.

Membership Committee. F. W. Perkins, Chairman; C. H. Hammond, H. K. Holsman.

Instructions: The Committee is instructed to formulate and carry out a campaign for an immediate increase of Institute membership in the various Chapters. The Board suggests to the Committee that it might be advisable to assign to each Chapter a definite quota of new members. The Committee is given power to add to its personnel as it may see fit.

Committee on Regional Representation. C. A. Favrot, Chairman; W. B. Faville, E. H. Hewitt.

Committee to Confer with French Architects. Charles Butler, Chairman; E. W. Donn, William Emerson, R. D. Kohn, J. L. Mauran, I. K. Pond.

Committee on Public Works. Charles A. Favrot, Chairman; Walter D. Blair, John P. B. Sinkler, Irving K. Pond, Edward W. Donn, Jr., William Mooser.

Instructions: This Committee is charged with the duty of coöperating with the Committees appointed by the conference held in Chicago on April 23–25 at the call of Engineering Council, for the purpose of securing the establishment of a Department of Public Works as well as considering public building methods throughout the country and other related matters. It is understood that Mr. Pond will act as the representative of the Institute and the Committee at any conferences that may be called by Engineering Council in connection with the establishment of a Department of Public Works.

Structural Service Committee. Sullivan W. Jones, Chairman; Rolland Adelsperger, John L. Hamilton, H. W. Tomlinson, F. Y. Joannes, Smith O'Brien, Stephen F. Voorhees, and Chairmen of the following coördinate committees: Basic Building Code, Contracts, and Fire Prevention.

Instructions: In addition to the instructions of the Convention, this Committee is charged with the task of advising and coöperating with the Journal in the continuation of its Structural Service work.

Committee on Community Planning. John Irwin Bright, Chairman; Frederick Bigger, M. B. Biscoe, Parke T. Burrows, Hermann Dercum, Henry Wright, A. L. Fechheimer, Thomas G. Holyoke, Walter H. Kilham, E. C. Klipstein, Louis Lott, Arthur L. Loveless, Dwight H. Perkins, Hermann Wischmeyer, Burt L. Fenner, R. D. Kohn, Arthur Rice, Charles H. Cheney, H. Olin Jones, John A. Miller, F. L. Ackerman, A. P. Clark, Jr.

Instructions: The Committee is instructed to continue the work as outlined in its report, and also to consider the various matters covered in the instructions for the preceding year which, on account of unusual conditions, have not been acted upon. The Committee is also charged with the carrying out of the instructions of the Convention.

Basic Building Code Committee. D. K. Boyd, Chairman.

Instructions: The Committee is charged with the duty of studying the best means of coöperation with other technical and scientific organizations, as well as with the Federal Government, all looking to the standardization of building code requirements throughout the United States.

Committee on Registration Laws. Richard E. Schmidt, Chairman; D. Everett Waid, Charles H. Bebb, Wm. P. Bannister.

Committee on Lincoln Highway. Elmer C. Jensen, Chairman.

Instructions: This Committee is instructed to consider ways and means whereby the Government may be induced to take charge of the project.

Committee on School Building Measurements. Wm. B. Ittner, Chairman; John J. Donovan, James C. Hopkins, F. A. Naramore, D. H. Perkins.

Instructions: The instructions to the Committee are as given by the Convention.

Post-War Committee on Architectural Practice. The President spoke of the work of the Post-War Committee on Architectural Practice, and the action of the Convention in endorsing its program.

Resolved, That the Executive Council of the Post-War Committee, Messrs. N. Max Dunning, Chairman; Robert D. Kohn, and Milton B. Medary, Jr., be reappointed, with power to change the personnel of the main Committee as it desires. It was further

Resolved, That, inasmuch as the Convention has endorsed the work of the Post-War Committee, it is therefore authorized by that action to proceed with its work.

The Treasurer was requested to advise the Committee that the Board is most anxious to keep expenses this year as far as possible within the Budget income. The Board requests the Post-War Committee to limit its expenses as far as possible, and that it submit to the Treasurer a statement of the expenses which will probably be incurred during the remainder of the year.

Committee on War Memorials. Mr. Horace Wells Sellers, Chairman. (Committee of one with subcommittees as may be appointed.)

Instructions: This Committee is charged with the duty of advising communities, organizations, and individuals in matters connected with the design and erection of war memorials; and with the duty of coöperating in this work with other national organizations, such as the American Federation of Arts. It is given authority to appoint such subcommittees as it sees fit in the various Chapter territories of the Institute.

Committee on Small Houses. Mr. Edwin H. Brown, Chairman. (Committee of one with subcommittees as may be appointed.)

Consideration was given to the necessity of Institute action for the encouragement of better designs for small houses throughout the country; and to the Convention discussion of this subject. It was resolved that Mr. Edwin H. Brown, of Minneapolis, be appointed chairman of a Special Committee for this work, with authority to add to the membership of his committee as he sees fit.

The instructions to the Committee are that it be governed by the instructions of the Convention.

Declinations and delayed acceptances leave several important Committees as yet incomplete. It is expected that these may be published in the next issue.

Report of the Judiciary Committee

TO THE MEMBERS OF THE AMERICAN INSTITUTE OF ARCHITECTS:

The "Rules for the Guidance of the Committee on Practice and the Judiciary Committee of the Board of Directors" require "that all findings of the Judiciary Committee, whether in favor of or against the member involved, with the action taken by the Board of Directors, shall be reported to each member of the Institute."

The Board of Directors has received the report of the Judiciary Committee in reference to charges of unprofessional conduct against the Institute members named herein.

These findings of the Judiciary Committee (in small type) and the action of the Board of Directors thereon, are hereby transmitted in accordance with the rules mentioned above.

Findings of the Judiciary Committee

"When the Judiciary Committee of the Institute assumed its duties, some time subsequent to the Fifty-first Convention, its predecessor had pending one case, namely, the charges of unprofessional conduct against Frederick W. Garber and Clifford B. Woodward, Institute members of the Cincinnati Chapter, on the ground that they had supplanted a fellow architect in violation of the tenth canon of the Canons of Ethics.

"Under the By-laws of the Institute, as amended at the Fifty-first Convention, it became the duty of the old Judiciary Committee, of which I was chairman, to conclude its work on this pending case.

"The Committee on Practice reported to the Judiciary Committee that it had found a *prima facie* case against Messrs. Garber and Woodward for violation of the tenth canon of the Canons of Ethics.

"The Judiciary Committee gave careful consideration to the report of the Committee on Practice and to the evidence accompanying the same.

"A hearing was then held before the Judiciary Committee in Washington on January 18, 1918, at which the entire case was examined *de novo*.

"In the light of the new evidence brought out at the hearing, the Committee is unable to affirm the decision of the Committee on Practice, and exonerates Messrs. Garber and Woodward of the charge of unprofessional conduct."

The Board of Directors has accepted this report and findings of the Judiciary Committee as submitted above, and hereby exonerates Messrs. Garber and Woodward of the charges of unprofessional conduct.

Very truly yours,

WILLIAM STANLEY PARKER, *Secretary*.

Obituary

James H. Windrim

Elected to the Institute in 1876; to Fellowship in 1880
Died at Philadelphia, April 26, 1919

At the last meeting of the Philadelphia Chapter, the Secretary read the following note and resolution on the death of Mr. Windrim, and they were ordered to be spread upon the minutes of the meeting:

In the death of James H. Windrim, the Philadelphia Chapter lost the dean of its architectural membership and the city of Philadelphia a most distinguished citizen, one whose practice extended over a period of many years and to whom the city is indebted for a large number of its important buildings. Mr. Windrim was president of the Philadelphia Chapter from 1879 to 1886.

In addition to the practice of his profession, he took an active interest in public affairs, filling the position of Supervising Architect of the Treasury Department from 1889 to 1891, when he resigned to assume the office of Director of Public Works of Philadelphia, which office he retained until 1895. During his incumbency, and under his able administration, many civic improvements were carried to completion.

Mr. Windrim evinced in his work good judgment in design and administrative ability, with which he was largely endowed. His professional accomplishments were many, and his generous and kindly consideration, as well as his unfailing courtesy, will be remembered with gratitude by all who came in personal contact with him or had occasion to seek his advice. He stood for high ideals in

practice as he did in life. His long and distinguished service to our profession merits the highest appreciation and recognition. And therefore be it

Resolved, That the Philadelphia Chapter express to Mr. Windrim's family its deepest sympathy in their bereavement.

Frederick Charles Lebenbaum

Born at San Francisco, Calif., September 15, 1882
Died at Chicago, Ill., December 17, 1918

Mr. Lebenbaum studied at the Massachusetts Institute of Technology during the years 1905–1906. He then attended the atelier of M. Laloux, in Paris, during 1907–1908. In 1909, with Samuel A. Marx, he organized the firm of Lebenbaum & Marx, and was in active practice from then until the time of his death. Mr. Lebenbaum assisted in designing and building the New Orleans Municipal Art Museum, the industrial town of Langeloth, Pa., the St. Louis-San Francisco Railroad Station at Oklahoma City, Okla., and many buildings of every description in Chicago.

Wallace Clement Ware Sabine

The Harvard Graduates' Magazine for March contains a note on the death of Professor Sabine of Harvard University, long known to many members of the Institute as an authority on acoustics, and from a minute of the Faculty of Harvard University we are privileged to quote briefly on the life and work of one who had made so great a contribution to the theory and practice of a factor in architecture, the importance of which cannot be set too high.

Professor Sabine was born in Richwood, Ohio, June 13, 1868, and his four names represent some family of his ancestors, who were Scotch, Dutch, English, and French. He gained the degree of A.B. at Ohio University at the age of eighteen. He entered Harvard in 1886 as a graduate student in mathematics and physics, and received the degree of A.M. in 1888. From 1887 to 1889 he held a Morgan Fellowship, but in the latter year he became an Assistant in Physics. He was made Assistant Professor of Physics in 1895.

"The Fogg Art Museum," says the minute of the Harvard Faculty, "on its completion in 1897, proved to have an auditorium that was monumental in its acoustic badness, and President Eliot, who had formed a high opinion of Sabine's qualities, called upon him to find a remedy, as a practical service to the University. With this warrant for diverting some of his energy from teaching, Sabine entered upon an investigation which proved to be his most conspicuous scientific work. Though he was dealing with a new structure, he was attacking a problem as old as the institution of public buildings. It had never been solved before in any thoroughgoing manner. He did solve it, and he did this not by virtue of any extraordinary resources given by modern science. He did it in such a way as to show that it might have been done by a man like him centuries before. Not only did he cure the defect of the particular room that first engaged his attention; he went on with his study till he could tell in advance what the acoustic qualities of a projected auditorium would be; and his visible instruments in all this achievement were organ pipes, common fabrics and materials, and the unaided human ear."

Professor Sabine became the dean of the Graduate School of Applied Science at Harvard. He lectured at the Sorbonne in Paris in 1917 and later was attached to the Air Service of the American Expeditionary Force. He returned to Washington as a consultant on airplane production and use, and his death was the result of overwork, due to his unwillingness to shirk any of his duties. He died on January 10, 1919.

Prof. Charles Peck Warren, A. M., A. I. A.

Charles Peck Warren, late Assistant Professor of Architecture at Columbia University, who died last October, was one of those quiet workers whose efficiency and usefulness are hardly appreciated at their true value until they are taken from us. Born in Brooklyn, N. Y., in 1869, he entered the School of Architecture at Columbia in 1886, and was graduated therefrom in 1890, taking the A.M. degree two years later. In 1893 he began his teaching in the school, and from that date until his death—a period of twenty-five, out of his too brief life of forty-nine years—his heart and strength were devoted to the service of the institution in which he had received his training. His department was that of construction, including at different times such related subjects as building materials, specifications, and architectural engineering. His clear and logical mind and his gift for illustration and concise exposition, enabled him to compress a remarkable amount of instruction into a small compass of time. It was this very compression and conciseness of presentation that, combined with his low voice and over-modest manner, prevented adequate appreciation of his courses at the time, except by the clearest-headed undergraduates. But testimony abounds from graduates as to their soundness and lasting value, and in spite of his exacting standards of performance, he was not only respected but loved by his students, and his loss is deeply felt by all whom he once taught as well as by his colleagues in the University and in the profession.

While thus engaged in teaching, Warren actively practised architecture, first in partnership with Grenville Snelling, later with William Adams; and was for some years associated with the writer in the design and superintendence of several buildings for Robert College at Constantinople, where he spent several months in 1912. He was a remarkable draftsman, a designer of fine taste and judgment, and equally skilled in the engineering side of his work. He was an Associate Editor of the last (16th) edition of the Kidder "Pocket-Book," to which he contributed a number of important articles.

In 1902 he married Mrs. Mary Merchant, formerly of Alabama, who survives him. He was a member of the Delta Upsilon fraternity, of the Columbia University Club, and of the American Institute of Architects.

Mr. Warren's circle of intimate friends was not large, but those who were privileged to belong to it will never forget the charm of his fine personality, the warmth and depth of his affection, the serenity of his disposition, his high ideals and the purity of his rare character. It is the still waters that run deep.—A. D. F. Hamlin.

Structural Service Department

SULLIVAN W. JONES, *Associate Editor*

In connection with professional societies, organized bodies, and the following Committees of the Institute, working toward improvements in building materials and methods, and higher ideals in the sheltering of humanity:

BASIC BUILDING CODE, CONTRACTS & SPECIFICATIONS, FIRE-PREVENTION, MATERIALS & METHODS, STRUCTURAL SERVICE

Pipe, Iron and Steel

Who knows the relative resistance to corrosion of steel and genuine wrought-iron pipe? Who has been able to reach a conviction on this point as the result of fifteen years' industrious publicity by the manufacturers of both varieties? Have the countless accelerated tests, service tests, and inspection reports helped to reveal the truth? Is iron pipe produced today the same as that made twenty, twenty-five, or thirty years ago? Is steel pipe better now than it was in earlier times? Is all iron pipe the same and are the several makes of steel pipe identical? Does galvanizing really add to the life of either or both? These are some of the questions which disturb the peace of mind of the architect or engineer who wants to specify the best.

A great deal of money has been spent by the makers of iron pipe and the makers of steel pipe in urging the merits of their respective products. But to architects, who generally do not qualify as metallurgists, physicists, or chemists, in weighing the technological data submitted, there seem to be no thoroughly impartial scientific conclusions available for their guidance in the selection of pipe. The American Society for Testing Materials is now conducting a series of actual service tests to determine the relative corrodibility of steel and wrought iron. The publication of the results of these tests will be awaited with great interest. In the meantime, and as contributory to the question at issue, we publish a report prepared by Dr. William Paul Gerhard, C.E., for presentation to the last Convention of the Institute at Nashville. This was not possible, owing to the decision to have no papers read at the Convention meetings. Dr. Gerhard's paper is published as a personal contribution and without prejudice.—THE EDITOR.

Cast-Iron Pipe or Welded Pipe for House Drainage
Calked-Joint vs. Screw-Joint, Wrought-Iron vs. Steel Pipe

By DR. WILLIAM PAUL GERHARD

Consulting Engineer, Honorary Corresponding Member, American Institute of Architects,
Member American Society of Mechanical Engineers

Among the questions which occur to the architect in his everyday practice, none are of more importance than those relating to the selection of suitable and adequate materials for construction and equipment. The kind of material to be specified for a building depends primarily upon the character of the latter, as well as upon the expected duration of life of the structure. The more permanent a building is intended to be, the higher and more durable should be the quality of materials to be incorporated in it.

The plumbing and drainage of a building form an essential part of its interior construction, because upon them depend the comfort and convenience, the safety and healthfulness of the structure and its occupants. A house drainage system may be divided into four equally important parts, viz.:

(1) The plumbing fixtures.
(2) The trapping system.
(3) The supply pipe system.
(4) The *drainage* or *waste system*.

Only the last-named system, which comprises the house sewer and its branches, the soil, waste, and vent pipe stacks, and the leader or rainwater conductor pipes will be considered in this paper.

In specifying this system, architects are confronted with the question whether cast-iron plumbers' soil pipe, with lead-calked joints, or screw-jointed welded pipe should be used. Both piping systems have their friends and advocates. When the Durham screw-jointed system was first introduced, about the year 1880 or 1881, the material used was genuine wrought-iron pipe. About 1890 the manufacture of mild steel pipe on a large scale was inaugurated, and after both genuine wrought-iron and steel pipe had been more widely used, a second question arose for the thoughtful consideration of the architect, viz., which of these two pipe materials should be specified, which was superior from the corrosion point of view, and which showed greater durability.

These questions and others incidentally connected with them became the subject of many controversies in the technical press, and were freely discussed by engineers, plumbers, and metallurgists. An opportunity came to the writer in the summer of 1918 to make, in New York City, an independent investigation of the subject, and he took it up with a very deep interest, if for no other

reason than to settle in his own mind some doubts which had occurred to him after a study of the "pros and cons" of the controversy. He, however, also looked upon the investigation as offering an excellent opportunity for eliminating prejudices and biased views, and for discovering more positive answers to these questions.

A full report of this investigation, with numerous illustrations, was presented by him at the annual meeting, on December 6, 1918, of the American Society of Mechanical Engineers. The following statement is condensed from it to serve the requirements of the architectural profession.

A total of 78 buildings on both sides of Broadway, from Bowling Green to 42nd Street were inspected. Buildings less than six stories in height, and buildings erected less than five years ago were omitted. For this reason recent high structures, like the Woolworth, the Equitable, and a few other buildings were passed over, for the age of their piping installation would not have warranted the drawing of conclusions as to the comparative degree of rusting of the materials used.

In the following Table I a summary is given of the buildings, according to their age:

TABLE I

Buildings over 30 years old	13
Buildings from 25 to 30 years old	10
Buildings from 20 to 25 years old	17
Buildings from 15 to 20 years old	17
Buildings from 10 to 15 years old	15
Buildings less than 10 years old	6
	78

Of these, 28 had cast-iron piping, 1 black wrought-iron, 3 mixed black steel and wrought-iron, 12 galvanized steel, 14 galvanized wrought-iron, and 20 mixed galvanized steel and wrought-iron piping.

It should be mentioned that the investigation was confined to the roof vent pipes and the cellar sewers; the water supply piping was not included. Complete records were made of the location and age of each building, the number of stories, the pipe material, the number of roof vent pipes, the number of roof vents from which samples were obtained for testing, the condition of the vent pipes and of the cellar sewers where accessible. All these details are embodied in diagrams accompanying the paper mentioned above. A somewhat condensed account is exhibited here in Table II.

TABLE II

Serial Number of Investigation	Name of Building	Age of Bldg. and Installation in Years	Number of Stories	Material of Vent Pipes	Condition of Vent Pipes	Condition of House Drains
48	Stewart Bldg.	Over 50	7	Standard cast iron, some black w. i. put in in 1884.	W. i. vents in good condition.	Cast iron sewer pitted inside very deep, still good.
47	Federal Court-house Post-Office Bldg.	51	7	Cast iron, ex. heavy.	Vents in good condition.	One c. i. joint leaking.
57	Broadway-Central Hotel	50	8	Cast iron, standard.	Vents deeply pitted but still good.	Light c. i. sewers in bad condition; numerous patches.
78	Metropolitan Opera House	36	7	Cast iron, ex. h.	C. i. vents evenly pitted.	6 c. i. joints leaking and recalked.
16	Welles Bldg.	36	10	Cast iron, ex. h.	2 c. i. vents in perfect condition.	Some joints of c. i. sewer forced out.
74	Marlborough Hotel	35	6	Cast iron, ex. h., some stand. c. i.	One-half of vents evenly pitted; rest good as new.	A number of calked joints show calking lead forced out.
75	Hotel Normandie	35	8	Cast iron, ex. h.	C. i. vents pitted very deep.	C. i. sewer apparently in good condition.
1	Washington Bldg., formerly Field Bldg.	34	11	Cast iron, ex. h.	Vents inaccessible.	C. i. apparently in good condition.
13	Produce Exchange Bldg.	34	7	Cast iron, standard.	Could not inspect interior of vents.	Sewers inaccessible.
33	Chatham National Bank Bldg.	30	8	Cast iron, ex. h.	5 vents pitted, but in good condition.	Noted 3 leaks on c. i. sewer.
38	Hotel Imperial, old part	29	9	Cast iron, ex. h.	C. i. vents deeply pitted, but otherwise good.	Sewers partly galv., partly c. i. in good condition.
23	Union Trust Bldg.	28	12	Cast iron, ex. h., also 4 galv. w. i. vents.	C. i. vents in good condition; 4 galv. vents in good condition.	C. i. in good condition; 4 joints had lead forced out.
12	Mail and Express Bldg.	27	10	Black wrought iron.	All black w. i. vents pitted, but in good condition.	Sewer apparently in good condition.
36	Postal Telegraph Bldg.	26	14	Cast iron, ex. h.; also 1 galv. steel, 2 galv. w. i.	C. i. vents pitted; w. i. in good condition; steel in good condition.	Sewers apparently in good condition.
52	New York Life Insurance Bldg.	26	13	Mixed galv. steel and galv. w. i.	11 galv. steel bad; 7 galv. steel galv. gone; 3 steel good as new; 10 black steel scaling badly; 1 w. i. galv. gone.	Sewers apparently in good condition.
37	Home Life Bldg.	25	18	Mixed galv. steel and galv. w. i.	2 black w. i. badly pitted; 2 galv. w. i. bad; 3 galv. w. i. good; 1 galv. steel bad.	2 sewer lines of screw-jointed pipe corroded and replaced.
27	American Surety Bldg.	25	21	Mixed galv. steel and galv. w. i.	6 w. i. good condition; 1 w. i. badly pitted; 1 steel very badly corroded.	Sewers inaccessible.
43	Langdon Bldg., formerly Mutual Reserve Life Bldg.	24	14	Mixed black steel and black w. i.	5 black w. i. good condition; 6 black steel, badly corroded.	6-inch w. i. sewer, apparently in good condition; no trouble with drainage.
21	Manhattan Life Bldg.	24	18	Mixed galv. steel and galv. w. i.	4 galv. steel very bad; 1 galv. steel very good; 2 galv. w. i. very good; 1 black w. i. pitted.	Sewers apparently in good condition.

TABLE II, continued

Serial Number of Investigation	Name of Building	Age of Bldg. and Installation in Years	Number of Stories	Material of Vent Pipes	Condition of Vent Pipes	Condition of House Drains
63	Townsend Bldg.	22	12	Galv. and black steel.	Black steel vents in very bad condition, only a shell remaining. All badly corroded.	Black w. i. house drains starting to go.
2	Bowling Green Bldg.	21	16	Mixed galv. and black steel and w. i.	Black w. i. vents nearly all good; 2 steel vents bad.	Some drain pipes started to give way three years ago.
9	Washington Life Bldg.	21	19	Mixed galv. steel and galv. w. i.	1 w. i. vent very good; 6 steel very bad at top.	C. i. sewer had 2 joints with the lead forced out.
19	Exchange Court Bldg.	21	13	Mixed galv. steel and galv. w. i.	Galv. vents scaling at top; some galv. w. i. vents good as new.	Galv. steel, apparently good condition.
71	Hotel Martinique, old part	21	16	Mixed galv. steel and galv. w. i.	2 steel very good; 2 steel scaling at top; 4 w. i. good as new; 1 w. i. scaling.	Galv. steel, apparently good.
5	Empire Bldg.	20	20	Galv. steel.	2 steel very good; 7 steel bad.	1 joint in c. i. sewer leaking.
16	Standard Oil Bldg.	20	15	Mixed galv. steel and galv. w. i.	6 galv. steel in bad condition; 4 galv. w. i. in good condition.	Some c. i. joints bad.
17	Hudson Bldg.	20	16	Mixed galv. steel and galv. w. i.	4 steel bad; 2 w. i. pitted but good.	W. i apparently in good condition.
64	St. James Bldg.	20	16	Mixed galv. and black steel, some black w. i.	Steel pipes scaling badly; w. i. pipes pitted but still good for many years.	Some drain pipes corroded at top; had to be renewed.
46	St. Paul Bldg.	20	25	Mixed black steel and black w. i.	2 black steel rusted to a shell; 5 black w. i. in good condition; 4 black w. i. pitted, scaling slightly.	1 black steel drain corroded and removed; 1 2-inch w. i. waste good.
49	R. G. Dun Bldg.	20	15	Mixed galv. steel and galv. w. i.	3 w. i. in good condition; 9 steel all bad at the top.	Screw-jointed sewer apparently good.
50	Vincent Bldg.	19	15	Galv. steel.	2 galv. steel vents scaling badly.	Screw-jointed sewer apparently good.
22	Century Bldg.	18	19	Galv. w. i.	All galv. w. i. vents in excellent condition.	C. i. sewer has two leaky joints.
28	American Exchange Nat'l. Bank Bldg.	18	17	Mixed galv. steel and galv. w. i.	9 galv. w. i. good; 2 steel bad; 1 steel slightly bad.	Sewers apparently in good condition.
69	Hotel Imperial Addition	18	17	Galv. steel.	2 galv. steel in good condition; 6 galv. steel scaling at top.	Galv. screw pipe sewer and c. i. good.
40	Broadway-Chambers Bldg.	18	18	Galv. steel.	4 galv. steel slightly pitted; 5 black steel badly scaling.	1 galv. steel sewer replaced, corroded.
8	Title Insurance Bldg.	16	15	Mixed galv. steel and galv. w. i.	5 galv. w. i. in good condition; 1 galv. steel scaling.	Sewers inaccessible.
30	Broadway-Maiden Lane Bldg.	16	18	Galv. w. i.	10 galv. w. i. vents in good condition.	Sewer w. i., apparently in good condition.
32	No. 180 Broadway Bldg.	16	12	Mixed galv. steel and galv. w. i.	3 galv. w. i. vents in good condition; 1 galv. w. i. bad.	Sewer c. i., but not seen.
61	Flatiron or Fuller Bldg.	16	23	Galv. w. i.	7 galv. w. i. in good condition; 3 galv. w. i. scaling slightly, but still good.	Sewer ex. h. c. i., apparently in good condition, no repairs.
14	New York Produce Ex. Bank Bldg.	15	12	Galv. w. i.	All galv. w. i. vents in excellent condition.	C. i. sewer; some joints have lead driven out.
65	Johnston Bldg.	15	12	Galv. steel.	Steel vents scaling at top, some very badly.	W. i. drain, apparently in good condition.
18	No. 42 Broadway Bldg.	14	21	Mixed galv. steel and galv. w. i.	6 galv. w. i. vents, very good; 2 galv. steel, badly pitted.	Inaccessible; trouble with calked joints.
38	City Hall Bldg.	14	12	Galv. steel.	3 galv. steel, fair, but rusting at top; 5 galv. steel scaling badly.	3 galv. steel, 1 galv. w. i. sewers, apparently in good condition.
67	Hotel Breslin.	14	13	Galv. w. i.	All galv. w. i. roof vents as good as new.	Galv. w. i. sewer, apparently in good condition.
6	Trinity Bldg.	13	21	Galv. w. i.	All galv. w. i. vents in good condition.	Sewer screw-jointed pipe, apparently in good condition.
31	Title Guarantee Trust Bldg.	13	9	Galv. steel.	Galv. steel vents in good condition.	Galv. steel in good condition; 1 drain gave way one year ago.
42	Barclay Bldg.	13	18	Galv. steel.	All galv. steel vents starting to scale at top.	Sewers: 1 galv. w. i., 1 steel, good condition.
58	Wanamaker Bldg., new part	13	14	Galv. w. i.	10 galv. w. i. vents in good condition.	Inaccessible, but no trouble.
81	Knickerbocker Hotel	12	15	Mixed galv. and black steel and w. i.	Some galv. steel scaling, some good; black steel vents scaling badly; black w. i. vents evenly pitted.	Could not get at drain lines.
10	Singer Bldg.	11	13	Mixed galv. steel and galv. w. i.	6 galv. steel, very good; 2 galv. steel bad, 1 w. i. bad.	Sewers not seen.
11	City Investing Bldg.	11	33	Galv. w. i.	All galv. w. i. lines in good condition.	Sewer in good condition.
24	No. 1 Wall St. Bldg.	11	18	Galv. w. i.	Galv. w. i. vents in good condition.	Sewer inaccessible.
7	U. S. Realty Bldg.	10	21	Galv. w. i.	All galv. w. i. vents in good condition.	Screw-jointed sewer apparently in good condition.
29	Lawyers Title and Trust Bldg.	10	18	Galv. w. i.	6 galv. w. i. vents in good condition.	Sewers apparently in good condition.
62	Fifth Avenue Bldg.	9	14	Galv. steel.	Galv. steel vents in good condition.	Sewer galv. steel, apparently in good condition.
72	Hotel Martinique, new addition.	9	16	Galv. steel.	4 galv. steel vents good condition; 7 galv. steel vents bad at top, scaling.	Sewer steel, apparently in good condition.
66	Centurian Bldg.	8	16	Galv. w. i.	All vents of genuine w. i. pipe, good as new.	No trouble with the sewers.
20	Columbia Trust Bldg.	7	22	Galv. steel.	Galv. steel vents good condition, some scaling at top.	Screw-jointed sewers, no trouble.
41	East River Savings Institution Bldg.	7	20	Galv. w. i.	6 galv. w. i. vents in good condition.	Galv. w. i. sewer, apparently in good condition.

As will be seen, this Table II gives the important buildings arranged in the order of their respective ages. It shows, what was to be expected: that the oldest buildings were fitted up with cast-iron pipe, first with light or standard pipe, and later on with extra-heavy pipe. The table, furthermore, brings out clearly the fact that, since

FIG. 1

the introduction of the screw-jointed system of house drainage, about the year 1881, preference has been, and is still given by architects and consulting engineers, to the use of welded pipe with screw joints. It confirms the fact that the latter system has such intrinsic merits and advantages as to render it superior to the cast-iron system. And this is true, not only of skyscraper buildings, but also of first-class residences and institutions.

About 1,676 roof vent pipes were inspected, about one-third of these being of cast iron, and two-thirds welded screw-jointed pipe. From these latter, over 500 samples were obtained and tested under the writer's direction, larger samples being referred, in doubtful cases, to the metallurgical and chemical departments of Columbia University for more complete analyses and report. A large number of vent pipes were selected to be photographed to show typical and actual conditions. The writer has a very large collection on file, from which a number were reproduced in the above-mentioned paper.

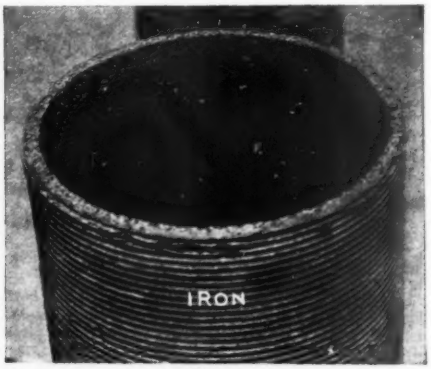


FIG 2

Tests. The tests made to determine whether a pipe was of steel or of wrought iron were of two kinds: namely, a chemical, the manganese test, and a mechanical or physical, the fracture test. These, as well as other useful tests are described by the author in a paper published in the *Journal of the Franklin Institute of Philadelphia* of January, 1919.

The manganese test is a comparatively simple one, and as it may be of interest for architects to know how they can readily tell whether a certain pipe is of wrought iron or of steel, a brief description follows. The test is based upon the fact that in the manufacture of steel pipe by the Bessemer process manganese is added to the molten metal in the retort, whereas no manganese is added to the wrought iron in the puddling process. The testing outfit comprises a wooden rack with glass test tubes, a bottle of pure nitric acid, a bottle of sodium bismuthate, an alcohol lamp, a steel pincer, and a small glass ladle. Test pieces of the metal are obtained after all rust, dirt, and galvanizing are first removed. One piece is dropped by means of the pincers into the test tube; ten or fifteen drops of nitric acid are added and the test

FIG. 3

tube heated over the flame of the alcohol lamp. The tube is then allowed to cool off, and a small ladleful of sodium bismuthate is added. The solution in the test tube then turns a decided pinkish color if manganese is present; if absent, a brown deposit occurs in the bottom of the tube and the solution does not discolor. The pinkish color indicates that the sample tested is steel, otherwise it is wrought iron. The entire test does not require more than a few minutes to make.

Results of the Investigation. (*A*) *As to the Character of Corrosion or Rusting.* The three different materials used for vent pipes showed two distinct forms of corrosion or rusting. The cast-iron pipes (see Fig. 1) and also nearly all the wrought-iron pipes were *pitted* or pock-marked (see Fig. 2), usually to a shallow depth, and the thickness of the pipe showed but a slight reduction. The steel pipes, on the other hand, exhibited a characteristic *flaking* or *scaling* (see Fig. 3). When these scales, the products of corrosion, are removed—and usually it is easy to do so by hand—there is often only a thin pipe shell left. Vent pipes having offsets often become choked up by rust scales falling off by their own weight. In the

examples given further on, a few characteristic forms of corrosion of both steel and wrought-iron pipe will be illustrated. The photographs will give a good idea of the conditions revealed by the investigation; a description in words would fail to give an adequate idea of the degree of corrosion.

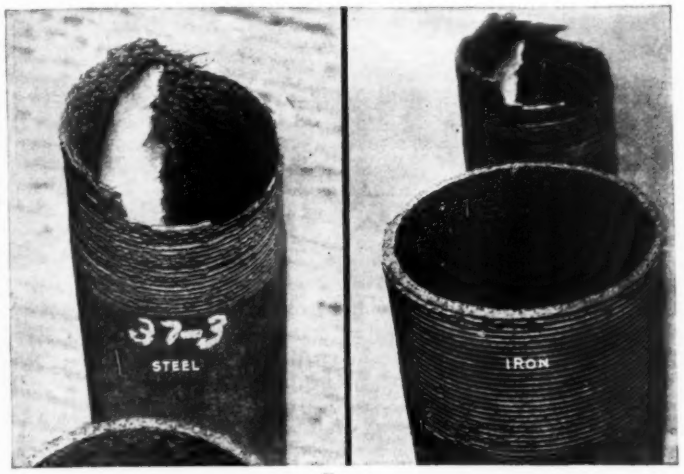


FIG. 4

(*B*) *As to the Durability of the Pipe.* The many photographs of pipe interiors obtained give a fair idea of the conditions observed, and prove, much better than words can, the suprisingly good condition of the cast-iron vents—some from thirty-five to fifty years old—the excellent showing made by the genuine wrought-iron pipe, even after twenty-seven years, and the inferior and very often extremely bad condition of the steel vents when in service twenty years or more.

The chief defect of the cast-iron piping is its lead-calked joint, which is not to be trusted as a permanent one, wherever large quantities of either hot water or steam pass through the pipes. Another objection, as is well known, is the greatly increased number of joints, which involve more labor in the erection and in the supporting of the pipe stacks.

The investigation showed conclusively that, in point of durability and liability to corrosion, steel pipe is inferior to both cast-iron and genuine wrought-iron pipe. Incidentally it appeared that the galvanizing coating is less of a protection against rust on steel than on wrought-iron pipes, and that usually it begins to disappear when steel pipe has been in service from ten to twenty years.

The evidence obtained from this careful inquiry leads to the conviction that genuine wrought-iron pipe is superior to steel pipe, and that the galvanizing lasts for a longer period of time on the former than on the latter. As corroborative evidence, Fig. 4 shows on the right-hand side of the illustration a black steel pipe and a black wrought-iron pipe on the roof of the Home Life Building, these pipes being located side by side and having had the identical kind and length of service, namely thirteen years. (This building is twenty-five years old and some of the roof pipes are as old as the building, but those shown were replaced after the fire of 1904). The pipe in front is of wrought iron, the rear pipe of steel, and its bad condition is shown even better in the enlarged form in the left-hand picture.

Another striking example of the comparative life of the two kinds of pipe is shown in Fig. 5, pipe numbered 43-11 being of black wrought iron, and pipe 43-10 of steel, both located on the roof of the Langdon Building, formerly the Mutual Reserve Life Building. These pipes are in service twenty-four years and the wrought-iron pipe is almost as good as new, whereas the steel pipe is badly corroded and scaling at the top.

Such examples could be repeated many times, but space forbids giving more than the few shown.

Condition of the Drains. It was attempted to learn some facts as to the condition of the inside of the house sewer pipes, but the information gained was largely "hearsay" information, at least as regards the screw-jointed sewers. In the case of cast-iron sewers, the fact long known was confirmed (see Table II) that the lead-calked joints did not remain tight, becoming affected sooner or later, and more or less, by changes in temperature.

Indiscriminate Use of Wrought-Iron and Steel Pipe. The many mixed steel and wrought-iron installations found point to the fact that in many cases the cheaper steel pipe was substituted for the more expensive wrought-iron pipe, specified, either intentionally, or because the wrought-iron pipe could not be supplied by the pipe jobbers in time, without retarding the completion of the building.

In looking over the propaganda literature issued by the cast-iron pipe manufacturers, one is struck with the

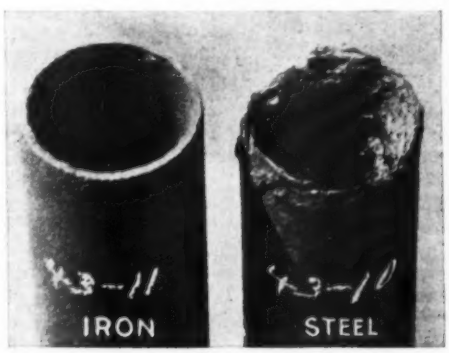


FIG. 5

fact that they have not always, in their investigations and reports, discriminated between steel and wrought-iron pipe.

The examination of some architects' specifications showed that wrought-iron and steel pipe were called for indiscriminately, no attention being given to the impor-

tant fact that genuine wrought-iron pipe must necessarily cost more than steel, but also that genuine wrought-iron pipe has shown itself, under a variety of service conditions, to be much more resistant to corrosion than steel pipe.

Conclusion. Inasmuch as prominent and costly buildings, both municipal and government buildings, as well as those erected by private enterprise, are expected to last from fifty to one hundred years, all building materials, and in particular those which are inaccessible after being installed, should have corresponding qualities of durability. For this reason, the conclusion is inevitable that the drainage system of permanent buildings should be either of standard or else of extra-heavy genuine wrought-iron pipe.

Acknowledgments. To the A. M. Byers Company, of Pittsburgh, Pa., the manufacturers of genuine wrought-iron pipe, belongs the credit for the opportunity of making this investigation as to the life of pipe in house drainage service. Their instructions are worthy of being repeated here, viz., that "the facts found should be stated without fear, favor, or prejudice and with no omissions, even if detrimental to wrought-iron pipe." Acknowledgment should also be made to the engineers and superintendents of buildings visited for the permission and assistance given so freely to inspect the pipe systems.

It is believed that this paper answers, as far as it seems permissible to draw conclusions from actual evidence, the questions propounded at the beginning.

For information on Byers' **Wrought-Iron Pipe**, see **Industrial Section**, page vi.

Data on the availability of **Cast-Iron Pipe** is given by the Cast Iron Soil Pipe Manufacturers' Association, page xxxii of the **Industrial Section.**

December, 1918.

Roofing

In the Manual of the American Railway Engineering Association there is a brief but comprehensive discussion of the materials commonly employed as roof-coverings, and the suitable uses for them. The Manual was published in 1915, and, consequently, some of the statements and conclusions may possibly stand in need of revision. Nevertheless, the discussion covers the subject so completely and is so obviously free from prejudice that it serves admirably as a skeleton for the more detailed discussion which the importance of tight and durable roofs seems to demand. The whole section on "Roofing" is, therefore, reprinted from the Manual and will be supplemented in this and specification uses with additional data which, in some cases, will explain the bare conclusions set down.

In selecting roofing there should be considered:

1. Chance of leaks due to character of construction.
2. Probable life, including chance of damage by the elements and by wear from other causes.
3. Fire-resisting value.
4. Cost of maintenance.
5. First cost.
6. Cost of laying.

The important materials may be classified as follows: Bituminous substances, applied with felts made of rags, asbestos, or jute; clay and cement products and slate; metals.

They are laid in two general types—that for a flat roof, cemented together, as a coal-tar pitch and gravel roof or as an ordinary tin roof, and that for a steep roof, laid shingle fashion.

Bituminous Materials. The common bituminous materials are: Coal-tar pitch (the heavier distillates of bituminous coal); various asphalts (bitumens found naturally in the solid state); various petroleum products; various animal and vegetable residue.

Value. Their peculiar value lies in the fact that they are practically insoluble in water; that they are elastic, adhesive and comparatively stable.

Coal-Tar Pitch. Coal-tar pitch is easily affected by the heat and cold, is not acted upon at all by water, is easily worked, and if properly protected is very stable. It should ordinarily be used as it comes from the still, "straight run," of a consistency suitable to the climate and to proper application.

Water Gas-Tar Pitch. Water gas-tar pitch, a by-product in the manufacture of water gas, which is enriched by gas from petroleum oils, resembles coal-tar. It is inferior to coal-tar for roofing purposes, and materials made from it should only be accepted in the low-priced products. It has more value as a saturant of felts than as a coating.

Asphalts. The asphalts are unsuitable for use in their natural state. They are ordinarily fluxed with products of petroleum.

Petroleums. The petroleums found in this country vary considerably, and grade roughly in quality, according to the location from east to west. The California oils, with their asphaltic base, furnish materials especially valuable for roofing.

Blown Oils. The blowing of air through a heated still of certain petroleum products produces "blown oils," which, while somewhat lacking in adhesive properties, are not easily susceptible to atmospheric changes and are especially valuable for roofing coatings.

Combinations. A single asphalt fluxed with a single oil is, for most purposes, a crude and unsatisfactory material. To secure the best results for any desired purpose, several oil and asphaltic substances must ordinarily be compounded. This requires skill and experience. Those properly made are invaluable for certain conditions, particularly for ready roofing, for which tar products are not suited.

The asphalt and petroleum products are not so readily affected by heat and cold as is coal-tar pitch, and lesser amounts of them are necessary to get good results. They are more expensive, require more skill in handling, and, when protected, some at least are, to some extent, liable to lose their life by drying out of the oil fluxes. Unprotected, they do much better than does coal-tar.

Felts. The bituminous substances are used with felts whose qualities considerably affect the roofing. The ordinary felt is made of rags, mainly cotton. "Wool felt" is a misnomer. Asbestos felts, as compared with the rag

felt, act less as a carrying medium for the bitumens, but rather as a protection to the layers of bitumen. They are not suited for use with coal-tar pitch, but are not injured by hot asphalt. They are more expensive than rag felts, but have some peculiar and valuable qualities. Burlap made from jute decays easily when not protected. It is used in a few ready roofings with rag felts to increase their tensile strength, the need of which is not generally agreed to.

Built-Up Roofs. The bituminous roofings come ready to lay, or can be built up on the roof, using layers of saturated felt, mopped with pitch and properly protected.

The built-up roof is especially valuable for flat surfaces. It can be made as heavy as desired, and, if properly laid and of good materials, gives a roofing which by long experience has been shown to be economical and efficient.

When Most Economical, Tile or Brick Protection. Where the roof is to be subjected to wear, and where the character of the construction warrants the expense, flat tiles or brick should be used as a protective coating to the roofing instead of gravel or slag.

Coal-Tar in Preference to Asphalt. For the flat roof built under average conditions, coal-tar pitch is recommended in preference to asphalt products. It is more easily handled, requiring less skill, and, while more material is necessary, it is still cheaper, and, in our opinion, more certain results can usually be expected from its use when laid by the average contractor. The large amount of material, while heavy, has insulating value. Good results, however, can be expected from built-up roofs using good asphalt compounds, where laid by skilled workmen.

Built-Up Roofs on Steeper Slopes Difficult. When the slope of the roof is over 3 inches to the foot, the application of a built-up roof becomes more difficult for both coal-tar and asphalt, it being harder to get even mopping, and there is more chance of accident for the men. The desirable straight-run coal-tar pitch cannot be used, it being necessary to add some stiffening material, which is supposed to somewhat affect the life of the pitch. This must not be done except under supervision skilled in such work, and especial care must also be taken in the selection and application of the stone or slag coating.

Ready Roofing. Built-up roofs with a ready roofing for the coating sheet are proposed by various manufacturers. They should have their best value for steep slopes.

Advantages of Coal-Tar Pitch. The advantages of a coal-tar pitch built-up roofing are such that it is recommended that where a permanent roof is desired, and where the character of the structure allows, the building be so designed as to allow its use. A flat roof makes an economical structure and has small fire hazard. A pitch of from one-half to one inch to the foot is better than anything steeper.

Life of Roof. With proper materials and application, a life of from fifteen to twenty years can be expected with a flat roof.

Flashings—Avoiding Cheapness. No contracts should be made for a built-up roof without a complete and positive specification including flashings, and the contract prices should not be less than those of the materials specified, plus the cost of laying and a reasonable profit.

Inspection. Thorough inspection of workmanship and material is recommended.

Ready Roofing. *Better for Steeper Slopes.* The ready roofing has better value for the steeper roofs than for those of small pitch. It averages much cheaper than the built-up types. Most kinds, to get a fair life, require occasional recoating. For flat slopes they are hard to lay absolutely tight, and they are not economical for a permanent structure, but on slopes of from 3 inches to the foot up their use is more justifiable.

Recommended for Temporary and Inexpensive Buildings. Ready or prepared roofings are recommended for use on small, temporary, and other buildings, where the cost, considering maintenance of more expensive roofings, is not justified. They are also of value for steep slopes, where a built-up coal-tar cannot be used, and for locations where the skilled labor necessary for a built-up roof is not available. The steeper the slope the greater their relative value and the wider their economical field.

Heavier Varieties, Longer Life. The heavier varieties are, in general, the more desirable because of their chance for longer life and their greater fire-resisting value. In making selections, the reliability of the manufacturer, service tests, and the cost should be the governing factors.

Ready Roofing Shingles. On the steeper slopes the use of ready roofing shingles, properly reinforced so as to prevent curling up at the corners and fraying on the exposed edges and laid shingle fashion, is growing. They are supposed to give better results than the rolled goods, but cost more.

Data on the Philip Carey Company's materials for built-up and ready-to-lay **Roofing and Shingles** will be found on page x of the **Industrial Section.**

Slate and Tile. Slate makes a good roof if of good quality and properly watched. It breaks easily and cannot be walked on without danger to the slate.

Tile of good quality gives good results. It is not so tight as slate, but does not break easily. It has architectural value, and its use is growing with improvement in the product and in the variety of colors.

Six Inches Per Foot or Over. Slate and tile of suitable quality, properly protected and fastened, can be recommended on roofs with a pitch of 6 inches to the foot or over, where expense is not the governing feature, and where they aid in producing the desired architectural effect, except that where there is much chance of driving snow, 8 inches to the foot should be the flattest slope allowed.

Asbestos Shingles. Shingles of asbestos and Portland cement are of value. They have some elasticity and can be laid tighter than slate. They come in a variety of shapes and colors and can be laid in various patterns.

Wood Shingles. Wood shingles are not desirable for a railroad structure on account of fire hazard.

Cement Tile. Small cement tile are not considered of much value, being brittle. Large cement tile, reinforced, laid without sheathing directly on the purlins, are in use on shops and freight houses and seem to have considerable merit. Glass can be introduced into them, avoiding the expense of skylights. It is not deemed advisable to recommend them for plastered or heated buildings or offices, where an occasional slight leak would be disastrous.

Metallic Roofings. Metallic roofings with steel as a base are not recommended for general use on permanent buildings.

Continual Maintenance. They require continual maintenance. Galvanizing of steel seems worth the expense. Tests of lead-covered steel sheets indicate good results.

Unheated Buildings. Large sheets of corrugated galvanized steel can sometimes be used economically where the buildings are not to be heated.

Metallic Shingles. Small metallic shingles of copper, tin, galvanized steel plate or pure iron are not recommended for general use. They are very light in weight, but serve a purpose in the dry climate of the Southwest.

Pure Iron Base. In using metals every effort should be made to secure those of good quality. The pure irons have value. Their virtues have, perhaps, been overstated, but they are not expensive, and experiences seems to indicate considerable economy by their use as a substitute for wrought-iron and steel.

For information on laying "**Target-and-Arrow**" **Roofing Tin**, manufactured by the N. & G. Taylor Company, see **Industrial Section**, page xi.

General. *Thorough Workmanship.* In the laying of all roofings, thoroughness in preparation of flashings and work around openings is of vital importance.

To get a satisfactory roof there must be a stable structure. Careful attention must be given to the design of gutters, and, with some types particularly, there must be systematic inspection and regular repairs. In buying a roof, its fire-resisting qualities, to a considerable extent depending on the quantity of the material as well as its quality, are of great importance. A building covered with a heavy coal-tar pitch and gravel roofing is a better fire-risk than one covered with corrugated steel sheets or with a light ready roofing.

Guarantees Unreliable. The practice of depending merely upon guarantees in selecting roofings cannot be trusted to secure proper results.

Saving in First Cost. The annoyance and indirect expense caused by leaky, short-lived roofs are rarely compensated for by any possible saving in first cost.

For the fire-resistant classification on **Roof Coverings** of the Underwriters' Laboratories, see page xii of the **Industrial Section.**

The Lighting of Buildings. II

Preliminary

In the May issue of the Journal we discussed briefly the fundamental principles of good lighting. In this issue we propose to discuss still more briefly a few of the practical means of putting these principles into practice.

Here again the subject will be presented in its most elementary form, so as to establish the fundamental requirements that must be met by every lighting arrangement, utilitarian or otherwise.

It cannot be too strongly emphasized that every lighting arrangement that is æsthetically correct, *ipso facto*, is necessarily physiologically correct. The converse is not true. As was pointed out in the May issue, to be æsthetically correct, a lighting arrangement must permit us to see properly and, doing that, it meets the conditions set by the eye. (See "The Relation of Architectural Principles to Illuminating Engineering Practice," Bassett Jones, Trans. I.E.S., Vol. 3, No. 1, p. 9.)

Lighting Fixtures

Lighting is not merely a matter of lighting fixtures. In itself, a fixture may be a beautiful thing to look at when illuminated by some other source—daylight, for instance. In design it may be perfectly in harmony with its environment. Yet it may, and, as commonly conceived and selected, usually does, fail utterly in its function as a source of pleasing and comfortable illumination.

Because fixtures are thus produced and so accepted by the architect, there is no necessity for the fixture maker to know anything about light, and so he rarely does. The fixture manufacturer will never become more than a maker of more or less beautiful objects in metal and glass until it is demanded of him that he provide good lighting as well. It is a fact that many fixture manufacturers who build only competitive commercial fixtures produce vastly better lighting arrangements than those who pride themselves excessively on their tone as artisans in metal.

After all, glass, not brass, is fundamental in illuminating devices, and metal is required only to support and hold the glass in proper relation to the lamp.

Silk and parchments of various kinds can be used in place of glass with effect, and in many cases desirably so. Yet even here the fundamentals of proper lighting must control the result.

Thus, in many rooms, to conserve the character of the design the candle type fixture must be used. Usually the following thought is to imitate candle flames with the lamps. But this cannot be done, for, by no stretching of the imagination can any electric lamp be said to even remotely resemble a candle flame. Its brightness is enormously greater—dangerously so. Furthermore, the color and quality of light emitted by the two sources are entirely different.

The only recourse is to use either real candles and so be totally impractical, or to put circular shades about the lamps to reduce their brightness and to modify the color of the light. This, of course, is often done. But so little imagination is used that commonly the result is no better and sometimes worse.

It is not necessary that the shade so used be very opaque. It is rather more interesting to be able to see the filament dimly and greatly reduced in brightness. It gives a center to the light source and so avoids any appearance of a luminous mass perched on the end of the candle. But then the shade itself must be fairly large if its brightness is not to be a source of difficulty. If the shade be made large enough, say as much as 4½ inches across at the top when used with lamps 40 watts and less in rating, a small glass reflector looking upward may be fastened to the candle top and the shade supported from its upper edge. Thus most of the light will be thrown upward to the ceiling and conserved, permitting the use of smaller lamps. This keeps the meter from being overworked.

The lamp, being hidden from view by the shade, whether or not the auxiliary reflector be used, can be a standard straight-sided lamp. This also introduces economy in cost and maintenance. Lamp bulbs are not made in

certain shapes and sizes by accident, or otherwise without reason. Avoid frosted lamps, the smaller round bulb lamps, and candelabra base lamps wherever possible. They are neither practical nor economical.

The above account gives merely one tried way of making one type of ornamental fixture practical and do its work economically. There are many types of fixtures and many ways of skinning a cat.

Reflection

Before we go further into the question of fixture equipment, it may be well to explain what is meant by reflection. To do this a diagram will help.

When light falls on any surface or on a surface separating two media having different optical characters, some of the light passes through the surface and is either transmitted, or if the material beyond the surface be optically dense, it is absorbed. The remainder of the light is reflected.

Reflection at such a surface takes place in either one of two ways, or a combination of both, depending on the character of the surface. If the surface be highly polished and very dense, as in a mirror, the type of reflection is called direct or *specular*. All reflected rays bear the same relation to each other after reflection that they did before reflection. Thus, in Fig. 1 (Direct Reflection), the ray R_1 strikes the surface S_1—S_2 at F and is reflected to R_2 in such a manner that the angle between R_1 and the surface is the same as the angle between R_2 and the surface.

If, however, the surface be rough, as a piece of blotting paper, then the relation between the reflected rays and the incident rays is not the same. The rays are reflected at all angles and the distribution of the reflected rays depends on the character of the surface. Such reflection is called *diffuse reflection.*

If the surface be perfectly matt in character, then the angle of the incident ray has little or no result on the distribution of the reflected rays. The distribution of the reflected rays is always the same. Such reflection is called perfectly diffused reflection. Thus, in Fig. 1 (Theoretical Diffusion), no matter what the angle of the incident ray, the reflected rays are always distributed so that if a figure be drawn in which the length of the reflected rays R_1, R_2, R_3, in any direction be made proportional to the intensity of the reflected light in that direction, the curve drawn so as to enclose all such rays will be a circle tangent to the surface.

Even the best mirror shows slight diffusion, else it could not be seen except from the direction in which light rays are reflected.

Every common surface, such as painted walls, wood walls, opal glass, etched glass, china enamel, etched or rough metal, shows some specular or direct reflection, so that the distribution curve of intensity of reflected light is not a circle, but is generally more or less elliptic in form, its inclination to the surface depending on the angle the incident light makes with the surface.

The ratio of the amount of light reflected from a surface to the amount of light received on the surface is called its *reflection factor.* A knowledge of the reflection factors of the various materials used in interior finishes, window glasses, skylight glasses, and of the materials used in lighting fixture equipment is essential to any rational attempt to lay out lighting arrangements. As we saw in the May issue, the reflection factor of interior finishes is fundamental in illumination.

But the measurement of the reflection factor, particularly of colored surfaces, is by no means a simple matter. When the reflection factor of pigments is being determined, it is first necessary to establish some standard method of preparing the samples for measurement that will give consistent results. And in the use of the values obtained it is necessary to know how far the standard is varied by the

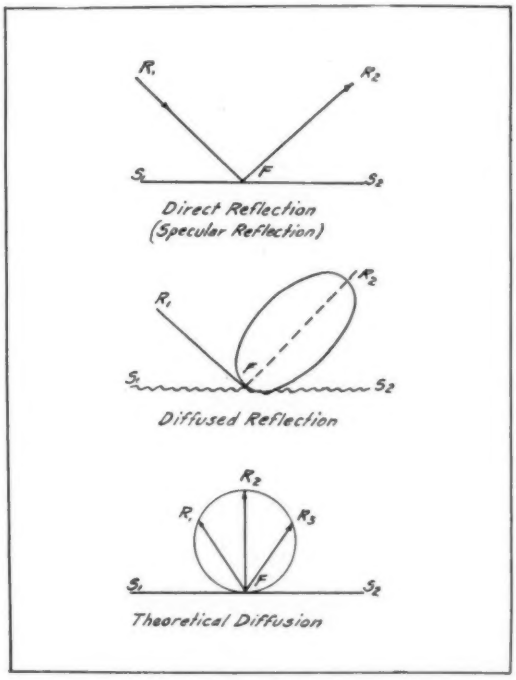


FIG. 1. Reflection

various methods of application of the material, and, particularly in the case of paints, the effect of the character of the surface to which the paint is applied and the effect of aging.

The reflection factor of a few commonly used materials follows. (In all cases the measurement was made in an integrating sphere photometer, angle of incidence 45 degrees, checked in several cases by calculations based on point by point measurements taken on a bar photometer. The comparison standard was a block of freshly scraped carbonate of magnesia.)

Material	Thickness Inches	Refl. Factor	Transmission
Carbonate of Magnesia	——	0.88	——
Baked China Enamel on Steel	——	0.72	——
Belgian S. T. Mirror	0.085	0.80	——
S. T. Clear Crystal Plate	0.129	0.11	0.88
White Milk Dense Opal Sheet Blown and Flattened	0.115	0.74	0.12
White "Art" Opal (Equalite)	0.145	0.66	0.26
Flashed White Opal, Medium Density	0.088	0.48	0.43
White Blotting Paper	——	0.67	——

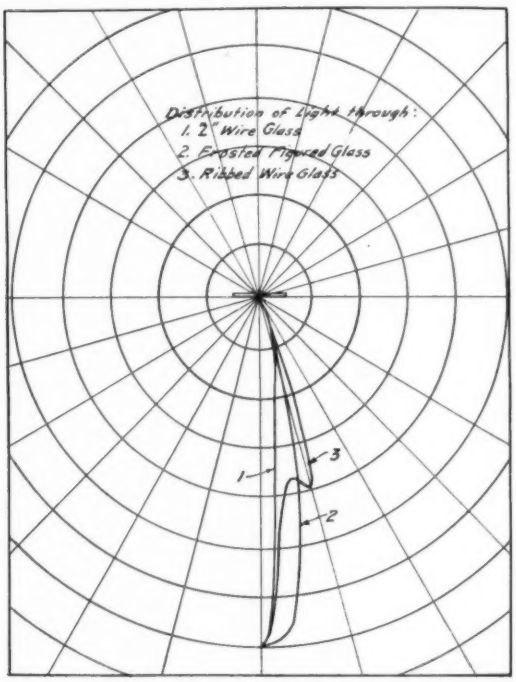


FIG. 2. Transmission Through Glass

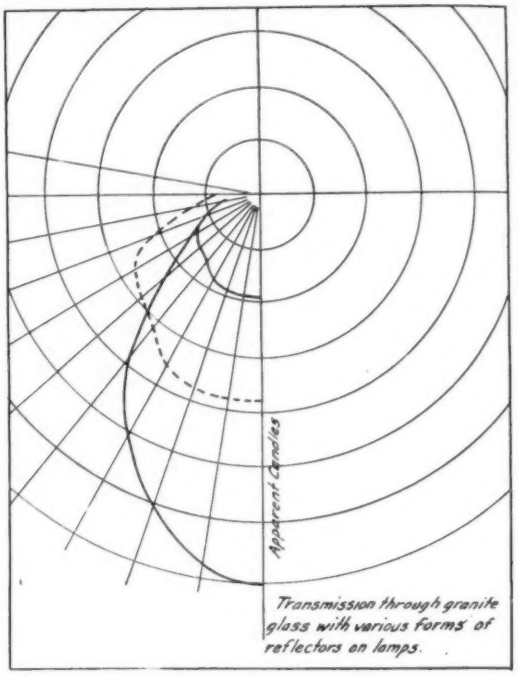


FIG. 3. Transmission Through Glass

Material	Thickness Inches	Refl. Factor	Transmission
White Plaster, Fresh, Unpainted	——	0.74	——
"Art Fire" Opal (Rough Side)	0.129	0.17	0.15
"Art Fire" Opal (Smooth Side)	0.129	0.29	0.13
Rough Surface Crystal (Rough Side) (Deflex No. 12)	0.164	0.13	0.90
Same, (Smooth Side)	0.164	0.25	0.66
Clear Wire Plate	0.275	——	0.92
S. T. Clear (Window)	0.125	——	0.85

The following values for paints are important. In all cases the samples were three-coat work applied over an egg-shell finish, red lead primer on black iron.

Material	Reflection Factor When Fresh	Reflection Factor After Aging One Year
Special White Enamel	76	73
White Lithopone	77	72
White Kalsomine	74	67
White Lead and Oil	75	67
Special Light Green Lithopone	52	48

The loss of reflection factor in white lead and oil and in kalsomine is large, also progressive—about 15% a year.

For the treatment of **Reflecting Surfaces**, see J. G. Wilson Corp., Diffuselite Dept., page viii, **Industrial Section.**

Transmission

If the surface on which the light strikes be glass, then some of the light is transmitted, and the distribution of the transmitted light depends on the character of the emitting surface and the body of the glass, either one or both. Thus clear glass, etched or otherwise surface-roughed, will diffuse the transmitted light, and so will opal glass with smooth or polished surfaces. The amount of diffusion also depends on the distribution of the light received on the glass.

The character of the diffusion in transmission produced by a few rough-surfaced clear glasses with incident light perpendicular to the glass surface is shown in Fig. 2. And in Fig. 3 is shown the diffusion obtained by similar glasses when the incident light is itself more or less diffused. The diffusion shown in Fig. 3 is very similar to the diffusion produced by opal glass with smooth surfaces when the incident light is perpendicular.

A rather interesting and important case is shown in Fig. 4, where the glass is ribbed in 90-degree prisms on one side only. Curves are here given for two such glasses. It is seen that both the transmission factor and the diffusion differ widely, depending on which side of the glass receives the incident light. In one case 46 per cent of the light is transmitted when the incident light is received on the smooth side, while 91 per cent is transmitted when the incident light is received on the ribbed side. An increase of 100 per cent. Yet such glasses have been frequently used in skylights with the ribbed side down, resulting in an enormous loss of light.

In the table of reflection factors above, some data on transmission factors were given. Some further important data with incident light (diffused) from the entire sky follows:

Material	Thickness Inches	Transmission
Rough Surface Crystal (Deflex No. 12) (Light Incident on Smooth Side)	0.164	0.58
Clear S. T. Frosted	0.125	0.70
Granite Wired	0.275	0.65
Large (90-Degree Prism) Ribbed Wired (Light Incident on Ribbed Side)	0.275	0.66
S. T. Granite (Light Incident on Smooth Side)	0.164	0.72
S. T. Clear (Window)	0.125	0.88

On comparing the values given in the two tables, it is obvious that the amount of light transmitted through

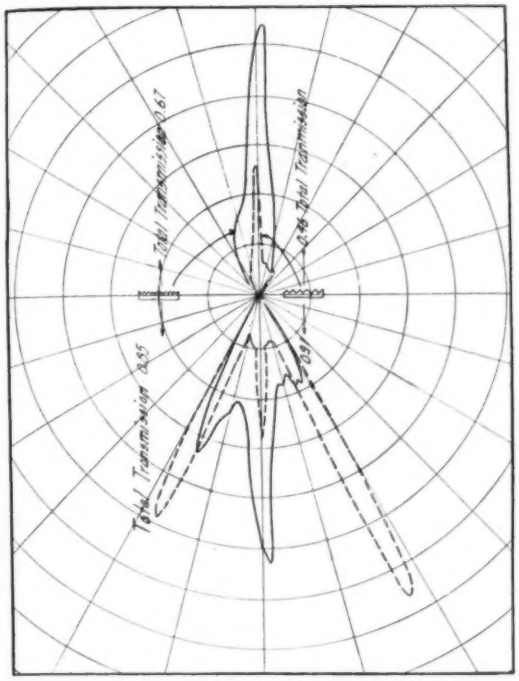


FIG. 4. Polar Diagram of Intensities Transmitted Light Through Ribbed Glass Incident Light Normal

figured or surface-treated glasses is a function of the character of the incident light; a fact that must be considered in using any data published on the subject. The amount of light transmitted also depends upon which side of the surface receives the light. Obviously, the selection of treated glasses for windows and skylights should be carefully made, and with understanding of the problem in hand.

Reference: Mississippi Wire Glass Company, page xxi of **Industrial Section.**

Reflectors

The brightness of a lamp may be reduced in two ways. The first is to use a protective covering, or enclosure, so dense optically that most of the light is absorbed and lost—a sort of "light bottle." This is the result in by far the larger number of lamp enclosures. Even when such enclosures are in the form of "reflectors" their contours are commonly designed to look well rather than give any desirable distribution to the light emitted by the lamp. Looks are all right, of course, but then one wants the lamps to do more than become merely bright spots in a decorative scheme. They must also give illumination where it is wanted. All of which seems obvious, but is commonly not the result obtained by the usual "decorative" lighting fixture and its equipment.

The second method of reducing lamp brightness is to surround the lamp with a large diffusing enclosure of low absorbing quality, so that but little light is lost by transmission. This enclosure then becomes the light source, but, its area being large, the amount of light emitted per unit area is small and its brightness is low. It would, however, require a very large enclosure of this sort to reduce the brightness of, say, a 200-watt lamp to a safe limit. The use of enclosures of this kind which are too small is common.

Of course, the material in reflectors is often made very dense and even completely opaque, so that the reflector will *reflect* light and not absorb it (as was explained in the design of the basins used in the example given in the May issue). Or, again, some transmission may be desirable as in the case of direct lighting with the reflectors near the ceiling, in which case light on the ceiling is needed to reduce the brightness contrast between the otherwise darker ceiling the the bright open reflector bottoms.

And while we are on this subject of *direct* lighting it may be well to say that, generally speaking, the nearer to the ceiling the reflectors are, the better the results, particularly if the walls and ceiling be light in color. There seems to be a popular fallacy among fixture makers that the lower down the lamps, the more effective is the fixture. If the reader is struggling with the pendant or drop cord nuisance, try the result of shortening the suspensions as much as possible.

FIG. 5. Deep Bowl—Glass

FIG. 6. Flare—Glass

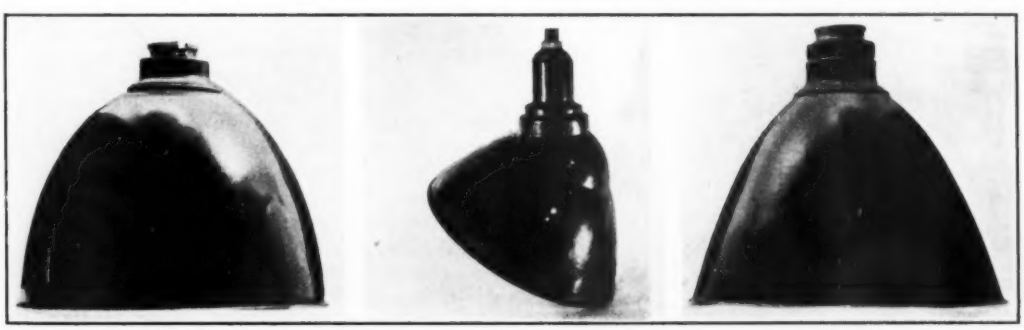


FIG. 7a
Deep Bowl—Steel Extensive Distribution

FIG. 9
Angle—Steel Assymetric Distribution

FIG. 7b
Deep Bowl—Steel Intensive Distribution

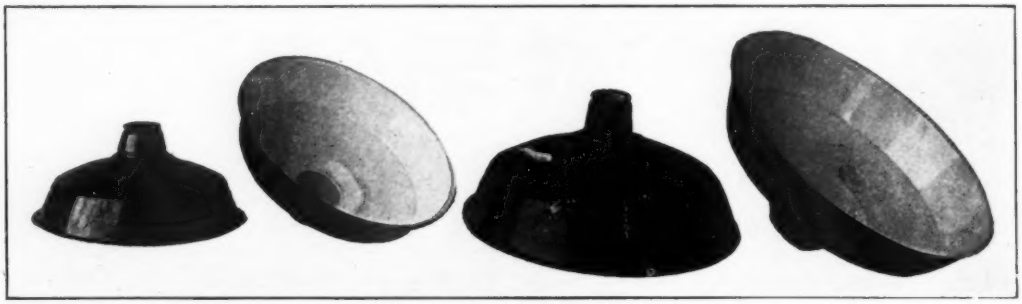


FIG. 8. R. L. M. Standard—Steel

Then, if you do not get enough light, put in larger lamps and reflectors and see if the illumination is not pleasanter and easier on your eyes.

Reflectors are commonly built in three styles, *deep bowl*, *flare*, and *angle*. The first two in glass, enameled steel and mirror, and all three in steel and mirror. See Figs. 5 to 9. The deep bowl types give a wide light distribution and effectually hide the lamp from view, the *intensive* type giving a narrower distribution than the *extensive* type. The flare types tend to concentrate the light below the lamp, and do not shield the lamps from view. The compromise steel type shown in Fig. 8 is commonly used for lighting large manufacturing areas, but, where hazard of breakage does not exist, the deep bowl glass reflectors may be used equally well, with the advantage of having some light on the ceiling.

Glass reflectors are preferably made of dense white opal glass without surface treatment to hold dirt. Etching and sand blasting are unsatisfactory as methods of obtaining diffusion.

Steel reflectors are better lined with white baked porcelain enamel. The aluminum finish, once popular, is now happily going out of use, and paint as a reflecting finish in reflectors is poor economy.

The reflectors or bowls used with semi-indirect fixtures like glass reflectors should be made of dense opal glass with highly polished interior surfaces. Do not be afraid to get the glass too dense, and, unless appearance counts more than light, do not restrict the opening, letting the shape always be fatter than a hemisphere, or, if a segment of a sphere, then less than a hemisphere. Avoid perpendicular reflecting surfaces at or near the plane of the lamp filament. Let the light out of the basin.

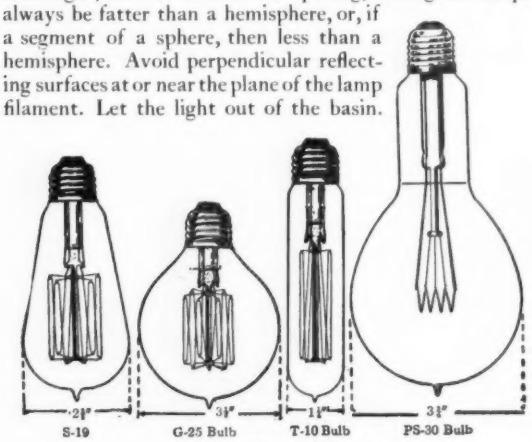


FIG. 10. Types of Lamps

A well-designed semi-indirect fixture should emit at least 80 per cent of the light emitted by the lamp, and all but a small amount of the light should go up, not down. As the ceiling is the principal lighting source, the fixtures should be hung with relation to the ceiling and not to the floor.

For **special reflectors,** see I. P. Frink, Inc., page xxx of the **Industrial Section.**

Lamps

Standard incandescent lamps, not considering miniatures, decorative lamps, or lamps for special purposes, are made in four styles (Fig. 10). These are the straight-side or Style S bulb, the round or Style G bulb, the tubular or Style T bulb, and the pear-shape or Style P S bulb. The Style G and Style T bulb lamps should not be used where the S or P S bulbs will answer the purpose.

The sizes of bulbs are their diameters given in eighths (⅛) inch. Thus an S-19 bulb is a Style S bulb, the round part of which is 19 eighths inches in diameter.

The Style S bulb is used only for Type B or vacuum lamps in which the filament burns in a vacuum. The Style P S bulb is used only in Type C or gas-filled lamps in which the filament burns in an inert gas. The Type C or gas-filled lamps are more efficient than the Type B or vacuum lamps because, in the former, the filament burns at a much higher temperature and is therefore much brighter. It is extremely dangerous to the eyes to use the Type C lamp exposed wherever it may come well within the field of vision.

Lamps are rated in terms of the watts of electric power they consume at normal voltage. For burning on 110-volt circuits, the standard ratings extend from 10 watts to 1,000 watts. Up to 60 watts, the standard lamp is Type B in S bulbs. From 75 watts to 1,000 watts, the standard lamps are Type C lamps in P S bulbs. The tendency is to reduce the line of Type B lamp ratings as the smaller sizes in Type C lamps are developed.

Care should be exercised in obtaining lamps of the proper voltage for the circuits on which they are to burn. A slight difference in voltage causes a considerable difference in the light emitted. Increased line voltage means decreased lamp life.

Final

It is hoped that the reader who has patiently followed these articles to the end will have learned that modern lighting as an art is not a simple problem, and that it deserves study by the architect, or, at least, his appreciation of its difficulties and his aid in overcoming them.

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